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CONTRIBUTIONS TO
THE HISTORY OF
AUSTRALASIAN
ORNITHOLOGY

VOLUME III

Edited by
WILLIAM E. DAVIS, JR.
HARRY F. RECHER
and
WALTER E. BOLES

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**CONTRIBUTIONS TO THE HISTORY OF
AUSTRALASIAN ORNITHOLOGY**

VOLUME II

MEMOIRS OF THE NUTTALL ORNITHOLOGICAL CLUB, NO. 18

William E. Davis, Jr., Memoir Series Editor

CONTRIBUTIONS TO THE HISTORY OF AUSTRALASIAN ORNITHOLOGY

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This book is dedicated to Ivor Beatty OAM (1934–2012) in appreciation of his outstanding contribution to the conservation of Australia's avifauna. Ivor was honored with a Medal of the Order of Australia (OAM) for service to conservation and the environment as a publisher of books devoted to Australian natural history, as founder and publisher of *Pacific Conservation Biology*, and to the community through Cystic Fibrosis New South Wales.

Preface

This book is the second of an envisioned series of three, which present an historical perspective on ornithology in institutions or regions of Australasia. The first volume, *Contributions to the history of Australasian Ornithology* was published in 2008, modeled on the three analogous volumes on North American ornithology, also published by the Nuttall ornithological Club. In this volume, we have included chapters on a professional organization, four museums, a research section of a museum, a region, and an early nineteenth century letter, a rather eclectic selection.

With the exception of the First chapter we have ordered the chapters roughly chronologically, with historically earliest subjects first, and within time periods by closeness of subject matter, for example the five chapters that deal with the ornithology of museums or museum departments, are grouped together.

As in all of these books, most of the chapters are “court histories,” written by people who participated in making the history they write about. Despite the obvious potential for bias, we think that histories written by “insiders” have some advantages over those written by “disinterested” historians. Insiders have the advantage of personal experience, an intimate knowledge of their subject matter, and access to rich anecdotal material that adds a distinctive character to descriptive or interpretive history.

Many of the histories (but not all) presented in this volume are largely descriptive rather than interpretive, but are a useful first step in laying the groundwork for future analysis. We hope that the essays in this volume will provide stimulus and interest, as well as a source of reference, to future students of ornithological history.

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Conservation through Knowledge: A Short History of the First National Ornithologists' Society in Australia

Libby Robin^{*}

ABSTRACT.—Australia's first national ornithological organization was established in the year of federation, 1901, as the Australasian Ornithologists' Union. This chapter traces its history from its foundation until 2012, when it became BirdLife Australia. Through most of its existence (1910-1996), the organization was known as the Royal Australasian Ornithologists' Union (RAOU). From 1996-2011 it was known as Birds Australia, and during this period had the motto "Conservation through Knowledge." In 2011, its members voted to merge with Bird Observation and Conservation Australia (BOCA), and from 2012 the overall organization is BirdLife Australia, although the RAOU and BOCA will remain within as bodies to receive bequests and donations.

The introduction begins with the idea of organizing for birds, including the foundation of the journal, *Emu*, published continuously since 1901. The three major parts of the chapter focus on the historically significant aspects of the RAOU's mission. Under the header "appreciating birds," we consider the nationalism that provided the context for the organization and the foundation of the Gould League and its associated natural history and educational activities.

Part 2, Science for birds, begins with the relations between amateur and professional scientists, and then turns to specific activities: systematics and the development of checklists, the International Ornithological Congress (Canberra 1974) and its legacies for RAOU, especially the *Handbook of Australian, New Zealand and Antarctic Birds* (HANZAB). Finally, the Australasian and Southern Hemisphere Ornithological Congresses are described.

The third part deals with conservation initiatives, both those, like the plumage trade, that united members of RAOU, and those like the question of private egg and bird skin collections that divided them. Atlassing proved to be a great new initiative that was both good for membership and participation in a national organization and good for conservation. It led on to Environmental Reporting and the important partnerships forged in recent years with government, community, and non-government organizations, including in buying land for the conservation of birds. BirdLife Australia

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will continue the mission to appreciate, understand and conserve birds. The chapter concludes with brief reflections on the role of history in the present organization.

INTRODUCTION: ORGANIZING FOR BIRDS

“Conservation through knowledge,” was the motto of Birds Australia.¹ “For the sake of the birds” is another from earlier times. Australia’s first national bird organization started life in 1901 as the Australasian Ornithologists’ Union (AOU) (RAOU Archives). From 1996-2011 it was known as Birds Australia. In 1910, it received a royal charter and for most of its existence (1910-1995) it was the Royal Australasian Ornithologists Union—or just RAOU (Robin 2001a). The RAOU was the second ornithological society in Australia, narrowly eclipsed by the South Australian Ornithological Association (SAOA) established two years earlier in 1899 (Collier et al. 2000). It was the first national society, launched in the same year as the federation of the nation (Figure 1).

The next society was the Bird Observers’ Club, a field ornithologists’ group established in Melbourne in 1905 that worked explicitly for “the conservation and preservation of our native birds” (Anonymous 1905, p. 186; Norman and Young 1980). Initially it was a “field ornithology society” started by the Melbourne members of the Australasian Ornithologists’ Union. In the 1950s it started its own journal, *The Bird Observer: The Official Organ of the Bird Observers’ Club* (from 1952-2002), which superseded *Monthly Notes* (produced by the Hawthorn Bird Observers’ Club). Since 2003, its central journal is *Australian Field Ornithology*, a journal that will continue alongside the older *Emu*, as part of BirdLife Australia. By the 1970s, the Bird Observers’ Club was much more than a Melbourne club, with branches in many states, particularly Queensland. In 1991, it became the Bird Observers Club of Australia (BOCA 1991), a separate national entity. In May 2011, the members of both Birds Australia and BOCA voted to merge and to create a new organization, BirdLife Australia. Over 93% of those that voted from BOCA and over 95% of those that voted from Birds Australia voted in favor of the merger (Birds Australia 2011). In 2012, the new organization was launched as BirdLife Australia. The mission of BirdLife Australia continues to be about bird appreciation, understanding, and conservation. Within BirdLife Australia, “RAOU”

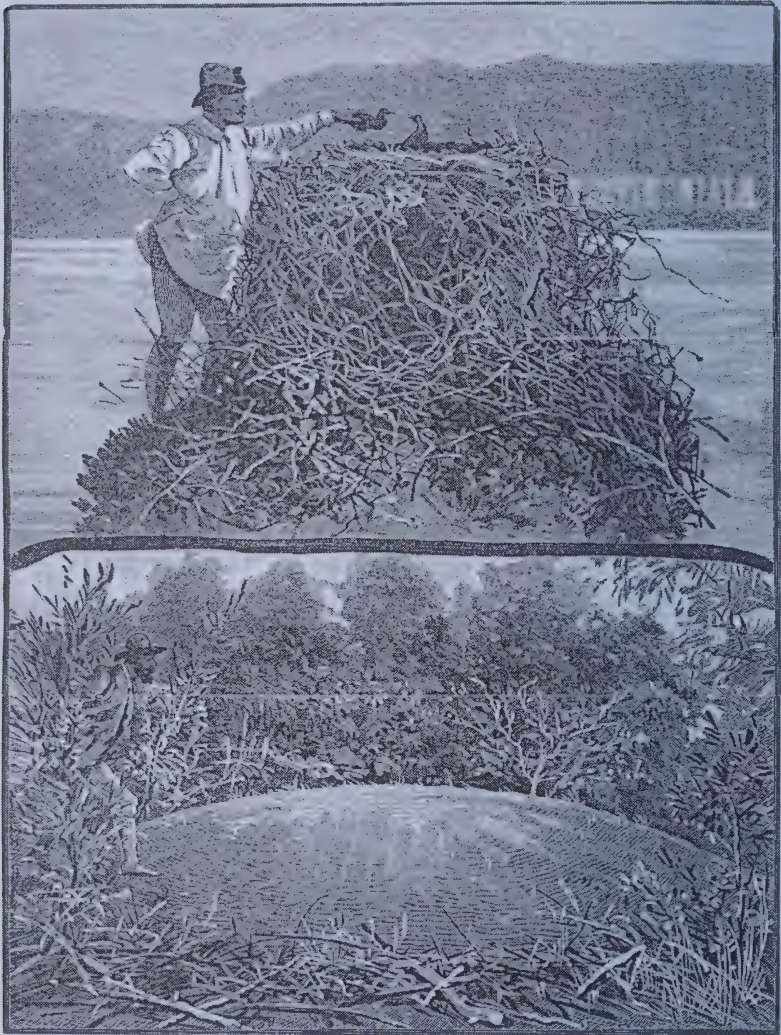


Figure 1. Sydney Congress RAOU 1921, featured many of the early founders of the Union. L-R Front row: E. M. Cornwall, E. A. D’Ombrain, A. J. Campbell, A. F. Basset Hull, A. H. E. Mattingley; Middle row: [?], Capt. S. A. White, J. A. Leach, Charles Barrett; Back Row: W. M. Alexander, J. E. Chubb, Neville W. Cayley, [?], G. F. Thomas. <http://nla.gov.au/nla.pic-an24862044>

lives on, through its honored “Fellows” and in official and legal documents. Similarly BOCA will remain as a body to receive bequests and donations.

Until 1940, when the Ornithological Society of New Zealand was established, the RAOU embraced both sides of the Tasman Sea. Thus, it had a greater reach than the Australian nation itself (federated in the same year, 1901). Western Australia had been tardy in joining the political federation, but it and New Zealand embraced the Australasian Ornithologists’ Union with more enthusiasm and confidence than the national federation.

The first AOU had many important members from New South Wales, but not a single member from the city of Sydney, perhaps reflecting the authority of the curator of ornithology at the Australian Museum, Archibald North, who opposed the initiative as too “populist.”



*Aerie of the Fish Hawk or Osprey
Egg Mound of the G. now Leipoa*

Figure 2. Aerie of the Osprey (*Pandion haliaetus*) (upper). Egg mound of the Malleefowl (*Leipoa ocellata*) (lower) (from visit to Western Australia circa 1900): Sketches by A. J. Campbell (prepared for illustrating an article in the *Australasian* on unusual nests) (NLA 24852399). <http://nla.gov.au/nla.pic-an24852399>

North resisted the new Union conceived to celebrate birds and observation, because he saw such a group interfering with his professional museum work. He wanted to distance himself from his old rival, the Melbourne journalist, Archibald Campbell, a founding father of the national organization and who, like North, had written much on the nests and eggs of Australian birds (Campbell 1883, 1900-1901; North 1889, 1901-1914) (Figure 2).

So why did Australia (and New Zealand) need a major bird organization in 1901? In this short sketch of a long and complex history I concentrate on three aspects of its mission: the *appreciation* of birds, the *scientific understanding* of their behaviour, and *conservation* of their habitat. Appreciation, science, and conservation appear in various guises in every era, whatever the organization has been called and whatever its motto. The most important practical reason for the organization was Australia's premier ornithological journal, *Emu*, published every year since 1901 (Volume 1). From 1963-2000 its subtitle was *Journal of the Royal Australasian Ornithologists Union*. In 2001 its subtitle was revised to *Austral Ornithology*, flagging its interest in birds of the southern hemisphere beyond Australia and New Zealand, and marking its new partnership with commercial scientific publisher, CSIRO Publishing (*Emu* 1901–).

The *Emu* is a major resource, not just for historical benchmarks in bird behaviour and distribution and for documenting important trends in scientific thinking, but also for its photographic and visual material. It is now fully digitized, so available internationally and for non-members as well. Because of its longevity, varied styles and content over the years, *Emu* is a rich resource, closely documenting changing ideas about birds over more than a century. Reading its pages reveals how people (amateur and professional alike) have watched birds over the years, developed theories about their behaviour and worked towards their conservation. People describing themselves as ornithologists were rarely trained scientists in the early years, but they were always excellent observers of birds and their behaviour and distribution. They were alert to changes and often became "whistle-blowers" in conservation questions. For example, when the population of Wedge-tailed Eagles (*Aquila audax*) fell dangerously in the 1950s in the period of soldier settlement and post-war expansion, it was the RAOU and *Emu* that spoke out against the practice of shooting them and showed

that it was a false assumption that they took young lambs (Sedgwick, 1949:201-202).

Many bird scientists now describe themselves as “avian biologists,” rather than ornithologists, thus differentiating their sense of birds as part of a broader story of biology from ornithology’s strong historic base in observation and conservation. The sort of ornithology promoted by RAOU over the years was, in a sense, the precursor for a different modern science, conservation biology, which emerged internationally in the 1970s and 1980s, and was dubbed by Michael Soulé as “a science of crisis” (1985:727). Conservation biology’s aspiration to merge science and policy was shared historically by the RAOU from its earliest days, as the issues of its journal *Emu* reveal (Robin 2001a:110-142). People notice birds. They are (mostly) diurnal and often beautiful and they give pleasure. The ornithologists of RAOU recognized their value as indicators of the health of the natural world. Birds were more readily and closely observed than insects or lizards or even plants, even though these are more diverse in species numbers. Because birds eat insects, reptiles, and plants, observations sometimes supplied information about other species and habitats. *Emu* recorded all such observations, large and small. For many years its “Stray Feathers” section gave bird observers the opportunity to contribute short observations, carefully edited by a range of knowledgeable editors. Reading observations gave bird enthusiasts pleasure even when they were not watching birds, and often stimulated conservation initiatives. *Emu* published concerns about changing numbers of birds and stories of their favourite haunts. Local observations taken together became the basis for a national or continental picture. This thread continues through the eleven decades of RAOU’s work, increasingly with links to the worlds of professional science and environmental management. In the twenty-first century, one of Birds Australia’s most prominent tasks is to compile a major annual review on *The State of Australia’s Birds* (Olsen and Weston 2003–2009, Paton and O’Connor 2010, Kirkwood and O’Connor 2010). Informed by the ongoing *Atlas of Australian Birds* (also Barrett et al. 2003, Blakers et al. 1984) and other monitoring programs, these are annual reports of population trends and changes for Australian birds which set a baseline for five-yearly overviews.

This chapter traces the ways appreciating birds, scientific understanding, and conservation concerns have interwoven in the ornithological activities of the RAOU. These principles shape

enthusiasm for birding around the world, but seldom is there such a long record of carrying them along together in a single society and its journal. There were not enough professional ornithologists in Australia and New Zealand for *Emu* to establish itself as simply a technical journal. For more than half its life, the journal carried general pieces; some of them fine nature writing. The best observers were not necessarily the scientific professionals, who in the early years typically



Figure 3. Sid Jackson, H. L. White's chief collector, with his a rope ladder up a gum tree at an eagle's nest. Photo: A. J. Campbell (NLA 24852317). <http://www.nla.gov.au/apps/cdview?pi=nla.pic-an24852317&referercode=cat>

worked in museums with dead birds. It was the egg collectors who knew birds' breeding locations and behaviour best. Their collections depended on nuanced understanding of nesting seasons and habits and they jealously guarded their secret "egging haunts." *Emu's* first readers were not always conservation minded in today's terms. Many of its keen early readers went to *Emu* for suggestions about how they might improve their collections of eggs, nests, or bird skins. Much of the discussion in the pages of the journal and in Council meetings in the first half of the twentieth century concerned private collecting, and whether it was an appropriate activity for RAOU members (Robin 2001a:79-115) (Figure 3).

The number of professional ornithologists in Australia was always very small, and the organization's primary activities—apart from its journal—were field trips and natural history meetings (often at a state or local level). At least until the 1960s, *Emu's* readership comprised mostly, knowledgeable, interested bird observers. The secretaries of state RAOU groups were formal members of RAOU Council, and this



Figure 4. A group from Birds Australia's Capricornia group surveying Fitzroy Vale, one of 14 National Waterbird Sites around Rockhampton, Queensland, which provided over 40,000 records of waterbirds comprising 50 species in 2008. Photo: Allan Briggs (Birds Australia).

was how the “field ornithology” was represented in a national organization. Such a large Council (over 40 members!) relying on postal communications to make decisions became unwieldy and the *Articles of Association* were changed, resulting in an Executive Council of nine members, with time-limited terms from 1970 (RAOU n.d., p. 10).

The RAOU was united by enthusiasm, practical knowledge, and members who loved birds. Because Australia’s population was mostly concentrated in the big cities of the south, much of the north and centre of the country was still being ornithologically discovered even in the twentieth century. As a national publication, the *Emu* published much to interest “armchair travellers.” Observations came from people in all walks of life, particularly those who had the opportunity to travel to remote places. “Rarities” were important to collectors and detailed local knowledge of remote places was important to conservation as well. In the period before 1970, Australian ornithology was more a hobby than a science. Arguably, it was more obsessive and focused than any profession, but typically bird observing was done on holidays and

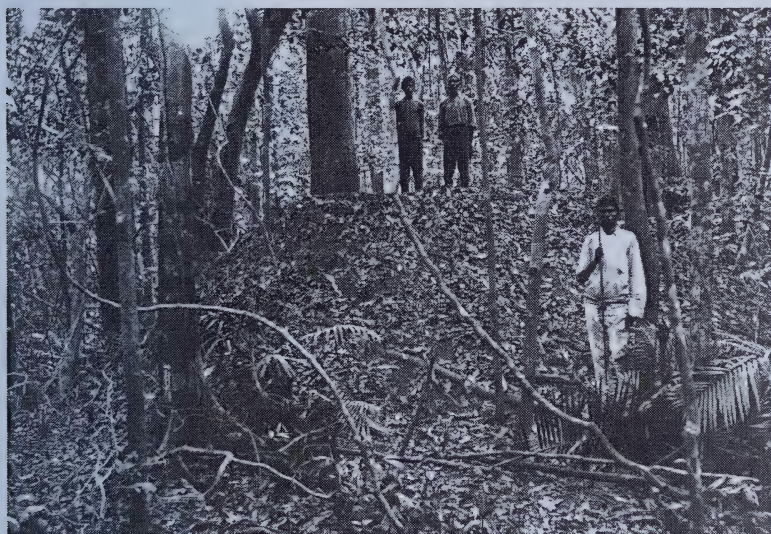


Figure 5. Unidentified Aboriginal egg collectors, Herbert River region, Queensland, probably part of the 1908 visit by Sid Jackson (Jackson 1909). Photo: Dudley Le Souëf (NLA 3799771). <http://nla.gov.au/nla.pic-anX>

weekends. The journal fed the bird-observing obsession for working days and weekends when bird watching was not possible (Figures 4, 5).

In addition to the *Emu*, a national body was ideal for lobbying for legislation to protect birds—particularly as natural resource and development legislation was generally effected at state level, so a national community carried independent standing. RAOU developed a range of activities that gave bird observers (whose field work was solitary) a sense of themselves as a bigger, more influential national community, a club that worked for birds, not just a scientific organization that studied birds. In an era where university qualifications were rare, many members of the Union would write “RAOU” after their names in correspondence about birds and conservation legislation, just as Fellows of the learned academies use those initials to stress their expertise. The passion for birds complicated the community, which at times struggled to include many diverse approaches to ornithology. *Emu* often had a difficult line to walk, particularly in relation to conservation and what was important “for the birds.” Developing a set of shared rational values was difficult, even for something as basic as a list of common bird-names.

PART 1: APPRECIATING BIRDS

A national organization for a new nation—1901.—The challenge was great in 1901. At 7.6 million km² (3 million mi²), Australia’s land mass is comparable in size to the contiguous United States (USA), but with few settlements in its arid zone, which is about 70% of the land mass. The Australian bird list is nearly as long as that of the USA and longer than the United Kingdom’s (UK) list, but compared with either, the number of observers were few, reflecting Australia’s smaller population (just 3 million in 1901; 22 million in 2010). The island-continent is surrounded on all sides by a large continental shelf, relatively recently joined to New Guinea and Tasmania, but divided from New Zealand by the deep Tasman Trench. Nevertheless, in British Empire thinking, Australia and New Zealand were regarded together as “Australasia.” Ecological boundaries within the continent are different from administrative and jurisdictional ones (Robin 2007). The boundaries between the states of the federation shaped much of the early politics of the Union, and continue to loom large in conservation



Figure 6. Rules of the Union 1901 (top), 1910 (left, after Royal charter) Photo: Libby Robin (RAOU Archives, State Library of Victoria).

matters, as the constitutional responsibilities of government for the environment and natural resources, such as water, forests, and near-shore fisheries, fall to states rather than the Commonwealth.

The first prospective members of the RAOU gathered in 1896, to develop a set of aims for their Society, which they published in the first issue of the journal *Emu* as:

“the advancement and popularization of the Science of Ornithology, the protection of useful and ornamental avifauna, and the publication of a magazine called *The Emu* . . . Thus bird students will be kept in touch with one another, original study will be aided, and an Australasian want supplied” (Anonymous 1902:33). (Figure 6)

Seventeen naturalists were invited to dinner at Britannia House in South Yarra by Archibald J. Campbell, a journalist, photographer, and public speaker well-known for his popular weekly articles on birds in the *Australasian* (Anonymous 1901:1–3). Instead of the formal toasts common at dinners in this era, Campbell gave his friends a bird talk illustrated by lantern slides, about the bell miner (*Manorina melanophrys*). The central business for this dinner was the appreciation of the natural world. Golden wattle (*Acacia pycnantha*) and pink heath (*Epacris impressa*) decorated the table, symbolizing a national spirit (Robin 2010). The centrepiece of the table was the moss nest of a mountain thrush (in this era *Oreocincla lunulata*, now Bassian thrush *Zoothera lunulate*) with eggs “fresh from the scrub” (Anonymous 1901:1). Birds were the important business of the night. It was after all, 15 August and the Spring nesting season was about to begin (Figure 7).

Discussion at the dinner focused on the gentlemanly passion of “oology,” then regarded as a science with concomitant technical language. Many of those present had pursued egg and nest collection since boyhood. Oology had given them a lifelong urge to study and

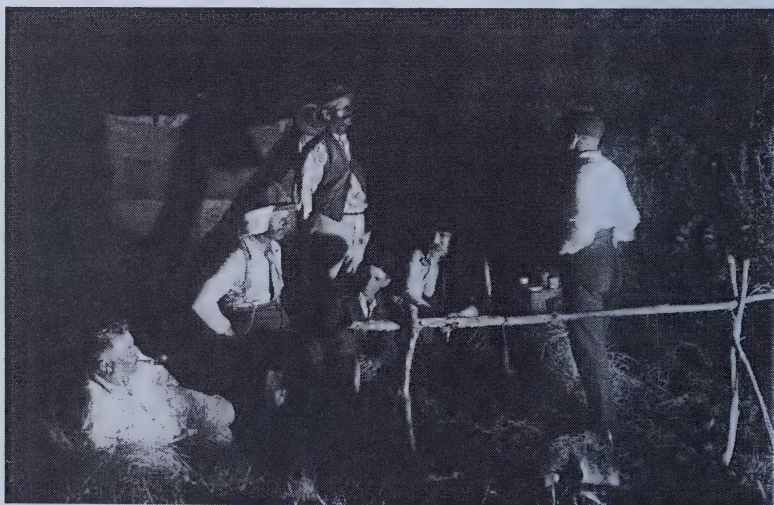


Figure 7. Ornithological campfire discussions, field trip early 20th century. Photographed in an era of pioneering flash photography using magnesium powder and the light of the fire. Photo: A. J. Campbell (NLA 24754827). <http://nla.gov.au/nla-pic-an24754827>

protect birds, and a fascination with their “nidification” or nest-making habits. Campbell’s stories of his excursions in country Victoria triggered reminiscences in his fellow naturalists. Before the group disbanded, there was talk of forming an Australian Ornithologists Union, “on similar lines to the British and American Ornithological Unions” (Anonymous 1901:2).

Three subsequent “ornithological reunions” were held at the Victoria Coffee Palace in Collins Street, Melbourne, in 1897, 1899, and 1900. The core group at these events was A. J. Campbell, Charles S. Ryan (a medical doctor) and Dudley Le Souëf, son of the Director of the Melbourne Zoological Gardens. These three conferred with other naturalists from Melbourne and elsewhere in Victoria and, when possible, further afield. Ryan and Le Souëf were cousins, sons of the formidable Cotton sisters, daughters of John Cotton who compiled Victoria’s first list of birds in 1848. Cotton’s five daughters all married well-known ornithologists. Ryan and Le Souëf worked closely together not only on the foundation of the Union, but also the Melbourne Zoological Gardens, where Ryan was a Council member and later President, while Dudley took over from his father as Director in 1902 (Robin 2001:355).

At the 1900 meeting, hosted by Le Souëf, the committee to create a Union was formally established. The Provisional (First) Committee of the Australasian Ornithologists’ Union was made up of “prominent members of the Field Naturalists’ Club of Victoria” (Anonymous 1901:2). The FNCV was a well-established society with a journal, the *Victorian Naturalist*, published since 1884 (which continues today). All the initial instigators lived in metropolitan Melbourne, but the idea of a national union met approval from senior interstate and country ornithologists, several of whom were present at the dinner, with many more sending apologies. The organizing committee comprised the stalwarts Ryan, Le Souëf, and Campbell, augmented by three additions, Joseph Gabriel and explorers Robert Hall (recently returned from trips to Kerguelen Island and the Houtman Abrolhos) and George Arthur Kearland (just back from the Kimberley region of north-western Australia) (Figure 8).

Over the next six or eight months, the Melbourne committee worked to ensure that the new organization would be well supported and have a genuinely national span. The committee saw that its first duties would include “the study and protection of birds” (Anonymous

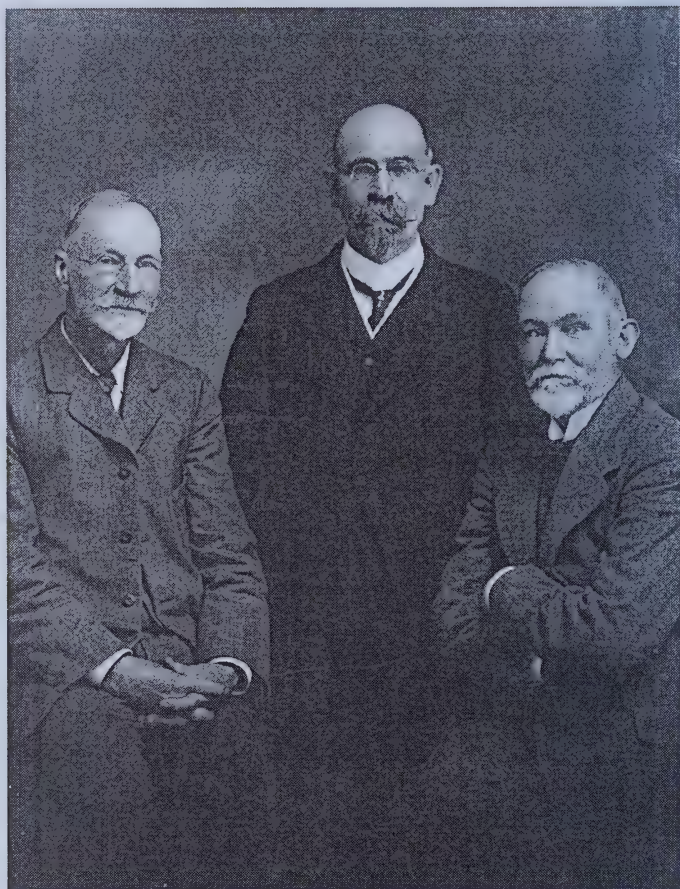


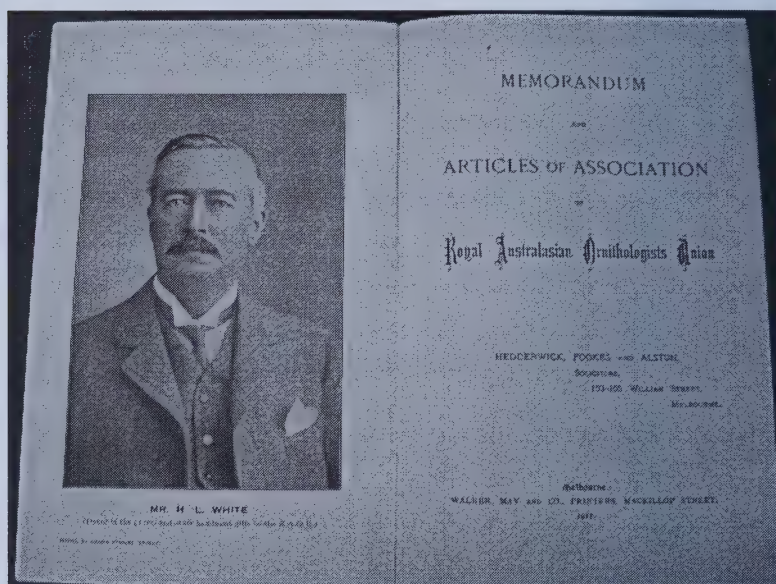
Figure 8. Three great RAOU stalwarts 1919 (left to right): A. J. Campbell (Foundation editor), A. W. Milligan (Western Australian collector), Dudley Le Souëf (Foundation secretary). All published articles in the first volume of *Emu*. Unnamed studio photographer (NLA 24784037). <http://nla.gov.au/nla.pic-an24784037>

1901:2) and a journal for the publication of ornithological papers. Dudley Le Souëf, the honorary secretary, issued a printed notice soliciting support for a national body for those “interested in the bird life of the continent.” “As it is now the beginning of a new Century,” he wrote:

“and the various Australian States have also Federated under one Governor-General, it seems that the time has arrived . . . Would you allow your name to be recorded as a member? It is proposed that the subscription be 15s [shillings] per annum, which will be used for the publication of the papers sent into the Union” (Le Souëf ca. 1900).

The interim council was also determined that this be no “Melbourne” club, consistent with the needs of its membership. Of the initial 137 members, only 66 came from Victoria, 29 of whom came from beyond Melbourne (Robin 2001:3). The Council approached South Australia, home of another well-established ornithological community (with its own South Australian Ornithological Association), to host the Union’s first formal meeting on 1 November 1901 in Adelaide. There, nationally representative office-bearers were elected to enable the practical organization to be centralized in the national capital, Melbourne, but many of the other roles went interstate. The first President, Colonel W. Vincent Legge, was from Tasmania, and Amandus H. C. Zietz of the South Australian Museum was one of the Vice-presidents. The onerous tasks of Secretary (Dudley Le Souëf), Treasurer (Robert Hall), and Editor (Archibald J. Campbell and Henry Kendall) were allocated to people living in Melbourne. Council meetings were held at Charles Ryan’s home and medical rooms in central Melbourne. There was a genuine interest in national subjects in these early years, including a focus on new birds in northern and central Australia and off-shore islands (reflected in the choice of Keartland and Hall for the first Committee). Many suburban-based bird observers in the cities concentrated on exchanging information about the exact ranges of familiar birds with country and interstate members. Western and eastern variations in common birds, such as magpies, were a particular interest, and “disjunct” populations—such as the Eastern (*Dasyornis brachypterus*) and Western (*D. longirostris*) Bristlebirds, separated completely by the Nullarbor Plain—fascinated ornithologists interested in evolution and adaptation within the continent. There was also note made of the breeding of recently acclimatized Laughing Kookaburras (*Dacelo novaguineae*) from the eastern states at Donnybrook in Western Australia (Anonymous 1903a:159). The journal’s editors actively sought out stories that united the continent and justified a “national” organization that could transcend the barriers of the former colonies.

The Union also attracted a small number of distinguished international ornithologists into its foundation membership. British ornithologist Philip Sclater, Fellow of the Royal Society and Chairman of the first meeting of the British Ornithologists' Union, endorsed the Australasian initiative to form a Union. The committee also enlisted the Duke and Duchess of Cornwall and York as patrons when they visited Australia in May 1901, a shrewd move that laid the groundwork for the



more influential in shaping its ongoing future than royal patrons and ties with British imperial science. White donated his extraordinary collection of 8,500 bird skins to the Museum of Victoria in 1917 (McEvey 1981). The collection had been largely amassed by Sidney Jackson (see Figure 3), one of the great professional collectors of the era, also a good photographer and regular contributor of illustrations for *Emu* (Hitchcock 1963). White's wealth enabled Jackson to travel widely, and amass skins, eggs, and stories from extremely remote places. Later, after White's death, his collection of over 4,200 clutches of birds' eggs, comprising 800 species, was also transferred to the museum. White was a generous benefactor to the Royal Australasian Ornithologists' Union, funding its first independent rooms and library in Melbourne during the difficult war years. All the while, White used the RAOU's national status to defend his own "national" collections from the Australian Museum in Sydney. Alfred North had declined to help White with identifications and other questions, so White deliberately cut his own state's museum out of his ornithological dealings, preferring to donate to the Victorian museum instead, with the awkward proviso that no specimen in his collection should be allowed to cross the Murray River back into New South Wales. White's collections were among the most important in his era and the Museum of Victoria (then known as the National Museum of Victoria) regarded them highly (see Longmore, this volume).

Plumage debates.—Although the first committee was all men, the new union was never designed as a gentlemen's club. It was about bird networks, not men's business. Birding was popular with women and six of the union's first members were women, including the first life member, Miss Amelia Pike. Many of the early excursions led by Campbell, such as the trips to gather mutton-bird (*Puffinus tenuirostris*) eggs (to eat) from rookeries at Cape Woolamai, were very popular with women. There were also strong external reasons to encourage women members. "The demands of murderous millinery and fashion," railed the *London Times* in 1903, "will continue until a knowledge of nature comes . . . Can we not enlist more ladies in our cause?" (Anonymous 1903b:117). The *Times* then proposed that the new Australian Ornithologists' Union should follow the American example and admit ladies "at nominal subscription"—apparently unaware that women were

already full members and regular contributors to the Union's journal. (Katie Langloh Parker 1902; "A Lady Correspondent" 1902)

The plumage trade was the first "national" (and international) cause of the RAOU. Prominent oologist, Arthur Mattingley raised concerns about the inhumane plumage trade after seeing his favorite eggling haunts along the Murray River "decimated" by plumage hunters. His articles in *Emu* began the national campaign that fed a wider international campaign. As sharp with his camera as his gun, Mattingley photographed the sight:

"that made my blood fairly boil with indignation...Nearly one-third of the rookery, perhaps more . . . [had] been shot off their nests . . . What a holocaust! Plundered for their plumes. What a monument of human callousness! There were 50 birds ruthlessly destroyed, besides their young (about 200) left to die of starvation!" (Mattingley 1907:71-2).

Mattingley's hard-won photographs prompted the national union to take a formal stand on the plumage trade with governments throughout Australia. The *Emu* published the minutes of the interstate conference on bird protection held in Melbourne in 1908, recognizing that the plumage trade was an international problem. The conference sought Commonwealth intervention to "introduce legislative measures in the interests of the protection of bird life, to supplement the existing State laws so far as concerns the export of plumes, emu eggs, &c." (Minutes of Conference 1909:1) and called on the federal government to invoke the Customs Act to limit international trade.

The Royal Society for the Protection of Birds in Britain republished seven of Mattingley's photographs in a booklet, *The Story of the Egret*, with text written by British campaigner James Buckland, who was the leader of the major campaign against "the white badge of cruelty," as he dubbed the plumage trade (Mattingley 1909). The International Ornithological Congress (IOC) in Berlin in 1910 supported this campaign and resolved that the necessary steps be taken "for an international understanding, determining the way to protect all birds, especially those persecuted for their feathers" (Colonial Office Britain unpublished). In 1913, the plumage and skins of fourteen groups of birds (including birds of paradise) were proclaimed "illegal imports." The same year, the United States passed two laws, one protecting all migratory birds and the other effectively stopping the millinery trade in

wild birds' plumage. Not long before the New York market closed, 4,500 bird of paradise skins had been sold to make women's hats in a single month (Stephens 1914). The London plumage markets closed the following year. The RAOU continued to lobby the government of Victoria to prevent the sale of egret plumes altogether, using economic arguments about the birds' usefulness to the pastoral economy (Norman and Young 1980:15). The fashions in ladies' hats changed after the war, affecting not just the trade in wild bird plumes but also bankrupting the Ostrich barons in South Africa (Nixon 1999). The wholesale slaughter of birds for the feather trade that characterized the period immediately before the Great War was never repeated.

The Gould League.—Another important initiative of the first decade of the RAOU was the foundation of the Gould League, established by John Albert Leach, author of one of Australia's earliest bird guides (Leach 1911), Editor of *Emu* and later President of the RAOU. Leach was Supervisor of Nature Study for the Victorian Education Department, when, in 1909 he received a suggestion for an educational league or nature study club. Jessie McMichael, a schoolteacher, wrote to Leach about "the thoughtless destruction of bird life," and suggested a club for children supporting her proposal with a generous endowment for "competitions and prizes" (Jenkins 1983:42; see also Victoria, Education Department 1976). The name, "Gould League of Bird Lovers" came from H. W. Bryant, another member of the Union (Mattingley 1935). Bird Day was proposed as a focus for Gould League activities in schools, and the first of these was held in Victoria on 29 October 1909. The following year the movement spread to New South Wales, South Australia, and Tasmania. It took on truly national dimensions when the Prime Minister, Alfred Deakin, consented to be the Gould League's inaugural President. A. G. Hamilton in Sydney advocated that "School bird study should begin with the birds of the playground, and gradually extend to wider fields." He suggested that bird-spotting was a training ground for scientific observation: "Children should record the birds seen and their observations on them in their note-books, and in a wall chart" (Hamilton 1912:121).

The innovative Director of Education in Victoria, Frank Tate, wrote an introduction to the 1911 edition of Leach's *Australian Bird Book* reinforcing the idea of bird study as a cultural, as well as a scientific activity. Australian nature should be better appreciated and

more part of mainstream culture, including literature. He suggested, "It is time we Australians fought against the generally received opinion that the dominant note of our scenery is weird melancholy" (Tate, Introduction, in Leach 1911:3). He suggested that prettier names were needed to encourage a love of birds, not just scientific identification. Leach took some direct initiatives with names, changing the "White-throated Thickhead" to the Golden Whistler (*Pachycephala pectoralis*) and the "White-winged Caterpillar Eater" to the White-winged Triller (*Lalage sueurii*), but such name-changes were controversial, as they introduced ambiguities between states. Leach had many supporters who firmly believed that vernacular names were a sign that local communities knew and loved their birds. A. G. Hamilton, for example, admired the fact that there were thirty local names for the babbler or chatterer [Grey-crowned Babbler] (*Pomatostomus temporalis*) around the New South Wales country town of Wellington. He advocated inventing names where no local name was known, using birds to develop a sense of local place and pride among the children of a district. He actively favoured local names like "peewit, blue wren, and jacky winter" over "magpie lark, superb warbler, and brown fly-catcher" (Hamilton 1912:122). Such developments quickly became a problem for the national body. The RAOU, although a strong supporter of the Gould League, focused on birds, rather than children, and wanted a national vocabulary that would enable reliable communication between districts.

The Gould League encouraged bird stories and other forms of bird appreciation, rather than egg-collecting, and most RAOU members, even those who regarded themselves as "oologists," supported the League's discouragement of child collectors. In retrospect, the Gould League is most famously associated with preventing children taking birds' eggs for fun. Its first pledge was "I hereby promise that I will protect native birds and will not collect their eggs" (Beck 1938:240). By the outbreak of World War Two, the *Emu* reported "visible results": the public was "definitely becoming 'nature minded,'" and "egg collecting by children [had been] reduced to a minimum" (Beck 1938:241).

Some of the great nature writers associated with RAOU worked to promote the Gould League, building on the 'public communication' spirit engendered by founder and journalist, A. J. Campbell. Eminent ornithologists willingly contributed high quality copy to education gazettes in all States. In Queensland, the *Daily Mail* journalist and

RAOU member, Alec Chisholm, took the lead in promoting a Gould League and Bird Day from 1916. When he left the State in 1922, he received a charming letter signed by 106 students from Southport State School, thanking him for his regular contributions about birds in the *Queensland School Papers* (Chisholm Archive: Correspondence 3 November 1922). Soon after, the Gould League in Queensland amalgamated with the Queensland Naturalists' Club to form a "Nature Lovers' League," later superseded by the Wild Life Preservation Society of Queensland. Chisholm went on to write many famous nature writing books, including *Mateship with Birds*, which was introduced by the famous bush poet C. J. Dennis (Chisholm 1922).

The New South Wales Gould League, strongly supported by the active Ornithological Section of the Royal Zoological Society of New South Wales, published *Gould League Notes* and sponsored a variety of field camps, exhibitions, and bird-call competitions. At the end of each bird-call competition, the imitators would co-operate to produce a Dawn Chorus—"as each child seeks to out-whistle or out-call the other, the result is a terrific hullabaloo" (Chisholm 1948:199). The League also sponsored a badge for "any boy or girl who can induce a native wild bird to alight on his or her person." In four years an astonishing five hundred children received the award (Jenkins 1983:43). Once the slingshot was banned, wild birds started coming into school yards at lunchtime. "I have seen wild birds catching flies from the hats of children and eating crumbs at their feet," wrote the Director of Nature Study in South Australia, where Bird Clubs were popular (Chisholm 1948:74). By the early 1920s, more than 200,000 children had joined "nature leagues" around the country (Figure 10).

Western Australia, which has one of the most active Gould League groups in the 21st century, was the last to begin. A Western Australian League was first mooted in 1920, when the RAOU came to Western Australia for its annual camp-out and congress. Leach remarked that "There is no reason why a 'Bird Day' should not be as necessary here as it is in the Eastern states" (Anonymous 1920). It was not formally established in Western Australia until 1939.

The Gould League's work and nature writing were also supported in the 1940s and 1950s by RAOU member and popular radio broadcaster, Crosbie Morrison, whose *Wild Life* radio show and magazine from 1938 celebrated nature in all its facets and who had a question and answer column for children, *Notes for Boys and Girls*. In



Figure 10. Graeme Hamilton (right) watches children cutting the ribbon to open the new Birds Australia Discovery Centre in Newington Armory in the parklands of Sydney Olympic Park in July 2008. A hundred years after the RAOU moved to begin educational birding through the Gould League, the Discovery Centre serves a new generation of children, and also many of Birds Australia's research and conservation projects, including the very successful Birds in Backyards program. Photo: Jen Sutfin (Birds Australia).

Sydney, Keith Hindwood wrote articles on birds in his column in the *Sydney Mail*; *Nature Notes and Studies* was often illustrated with his own photographs. Teachers drew on these popular columns to supplement the Education Department material when celebrating bird day, and for other activities in schools. Michael Sharland was another well-known journalist (and President of RAOU in 1949-1951), who worked professionally for the *Hobart Mercury*, *Sydney Morning Herald*, and *Melbourne Argus*, and wrote nature books, including *Tasmanian Birds* (1945) and *Tasmanian Wild Life* (1962). Sharland was also an outstanding photographer, winning two international awards for his bird photography. His long-running nature columns under the pen-name

“Peregrine” spanned sixty years. A generation later, Graham Pizzey, best known for his bird guides, contributed literary gems on the subject that were celebrated by Gould League and Field Naturalist Club members, as well as the RAOU (Pizzey 2000). Often the “appreciating dimension of the RAOU itself has been overshadowed by its rhetoric about science and conservation, but appreciation of birds and nature more generally has been fundamental to the RAOU’s history, and is still often the primary motivation for people joining the organization. Science and conservation are the outputs of the organization – but a love of birds is the reason members want to do these activities.

PART 2: SCIENCE FOR BIRDS

Systematics.—The advancement and popularization of the science of ornithology has been important throughout the history of the Union. As the first principles published in *Emu* stated (Anonymous 1902:33), science must advance, but it also must communicate. One of the first issues confronted by the national union was the need to communicate unambiguously in the journal and other publications of the society about the birds observed. This demanded an up-to-date list of known birds, their distributions and their scientific (and common) names. Archibald Campbell (Figure 11) and Robert Hall were among the founders of the Union deeply involved in this enterprise. They saw a new bird list as foundational to ornithological science, and to the functionality of the Union. There was universal admiration for John Gould’s nineteenth century legacy. Gould’s richly illustrated *Birds of Australia* (1865) was the major handbook for all, but there were differing opinions about how it should be updated. Gould’s was not the only 19th century work. The local natural historian E. P. Ramsay (1877, 1888) had also prepared “tabular lists of birds” showing distributions. Both Alfred North (1901-1914) and Archibald Campbell published works on the nests and eggs of Australian birds in the late 19th century and Robert Hall (1906) also prepared a “key” to Australian birds.

Gregory Mathews, an independently wealthy north Queenslander, who had moved to London in 1902, set himself the task of “updating Gould.” His first idea was to fund a revised set of coloured plates of the birds of Australia by the distinguished artist J. G. Keulemans, who regularly published in *Ibis*. Richard Bowdler Sharpe, international

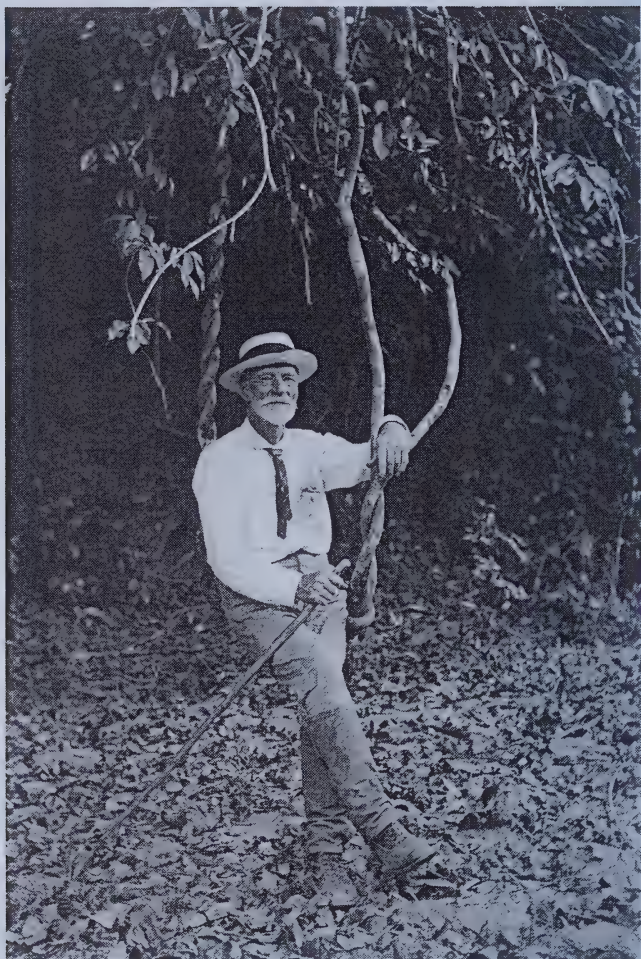


Figure 11. Archibald James Campbell, 1916. Campbell traveled widely with his journalism and used these opportunities to visit fellow members of the RAOU, discuss systematics, and photograph birds (Unnamed photographer, possibly south-eastern Queensland/northern NSW border country) (NLA 24777814). <http://nla.gov.au/nla.pic-an24777814>

member of the Union and ornithologist at the British Museum encouraged Mathews to begin with a “down to date” list of Australian birds, “there being no such guide in existence” (Iredale, in Mathews

1942:7). Mathews' *Handlist* was drawn up "to invoke the criticism and co-operation of ornithologists, in order to enhance the value of my larger undertaking" (Mathews 1942:Preface).

In his historical review of the ornithological discovery of Australia, John Calaby described Mathews as "the most important figure in Australian systematic ornithology [in the 20th] century . . . He introduced more scientific names, mostly of new subspecies, to the literature than any other person at any time" (Calaby 1999:325). Introducing more names, however, was controversial. Dominic Serventy remarked wryly: "the confusion resulting from the creation of many worthless sub-species by Mathews led to a marked [lack of] interest in taxonomical research within Australia for many years" (Serventy 1972:47). Indeed, even with the reinvigoration of taxonomy by DNA technologies in the latter part of the century, the task of sorting out the "Mathews mess" was regarded as an ongoing problem (Schodde 2000). Mathews' work demanded trinomial nomenclature, a method not advocated by Campbell, Hall, and other members of RAOU, but a



Figure 12. [left to right] John Leach, Les Chandler, Charles McLennan, Charles Barrett, Archibald Campbell, Dudley Le Souëf, Tom Tregallas, Zac Gray, and Gregory Mathews at the RAOU council meeting, 10 March 1914, notable because Mathews was in Australia at the time, and the RAOU checklist was under review. (Unnamed photographer, NLA 3799771). <http://nla.gov.au/nla.pic-vn3799771>

system used by much of the rest of the world. Mathews was, in Calaby's view, "the first worker in Australian ornithology to recognize geographic variation" (Calaby 1999:325), thereby fully embracing the implications of the work of Wallace and Darwin. Mathews was a prolific checklist writer. Because of his *Handlist* (Mathews 1908) he was appointed to the Union's checklist committee in 1909 (Figure 12). His *Birds of Australia* (Mathews 1910–1927) led to further checklists, prepared independently of the deliberations of the Union, with trinomial nomenclature. Mathews, who was living in London, used his own collections. Ultimately these numbered more than 40,000 skins and 5,000 books.

Meanwhile, the Union pressed on with binomial checklists, and with discussions about the vernacular names for birds. The first RAOU Checklist was endorsed by the Launceston congress in 1912 (Checklist Committee, RAOU 1913), but the debate about binomials and trinomials continued. In his 1914 presidential address, Arthur Mattingley admitted that the system of zoological nomenclature "has become a vexed question with us" (Mattingley 1915:20). The debate continued until 1926, when an official *Checklist* was finally agreed upon (RAOU 1926). Controversies continued much of the century and the list was contested and amended. Increasingly the *Checklist* looked out of date, but it remained a point of reference for standard terminology in the journal *Emu* right up until the 1970s. It was also the basis for the *order* of birds in Australia, starting with ratites and finishing with corvids, in line with international systems in this respect at least. The *Checklist* enabled bird observers in different states to exchange precise information about distributions, although international scientists at the British Museum and elsewhere maintained their own scholarly and technical readings of the birds of Australia.

New Zealand had its own champion, Sir Walter Buller, who published extensively on New Zealand birds (Buller 1882, Buller 1905). Birds with a distribution in New Zealand only (such as the kiwi *Apteryx* spp.) were not part of the RAOU 1926 *Checklist* or of the lists of Gregory Mathews.

Mostly amateur observers have worked well in partnerships with professional science and have welcomed the opportunities for dissemination that such associations have yielded. At times, however, there has been conflict between them: and sometimes "amateur" ornithologists felt underappreciated by science. As mentioned above,



Figure 13. Birds Australia's Southern Queensland group provides official water surveys to natural resource managers as part of its birding activities. Photo: Eric Anderson (Birds Australia).

the Australian Museum curator, Alfred North, was never associated with RAOU, and his perceived lack of appreciation of H. L. White's work resulted in those important collections being removed from the exchange circuit between museums. However, White's support for the Union, partly motivated by his vendetta against North, undoubtedly served science well in other ways. Thus, the RAOU became, in some ways, an "honest broker" that ensured non-professional ornithological expertise could be valued properly (Figure 13).

Museums and ornithology.—After the death of A. J. North in 1915, the Australian Museum, suffering war-time strictures, could not afford a paid curator of ornithology. RAOU member Arthur Basset Hull "volunteered his services in an honorary capacity" (Anonymous 1917:115) and the Trustees gratefully accepted (see Boles, this Volume). Basset Hull, a member of RAOU and President in 1918-1919, remained at the museum as honorary ornithologist for three decades until his death. The much younger Sydney businessman, Keith Hindwood also joined as an honorary ornithologist from 1930, serving for more than four decades in this capacity and as research associate, during which time he served as President of RAOU and was elected Fellow in 1951

(McGill 1971). Basset Hull and Hindwood contributed much to the public outreach of museum science, forming personal bridges between the public, institutions, and learned societies. Hindwood, as well as his nature writings, regularly entertained the Ornithological Section of the Royal Zoological Society of New South Wales with talks built around specimens from the Australian Museum. For example, in November 1945, he took in skins of four different bristlebirds *Dasyornis* spp. To these he added his own nests of the Eastern and Rufous Bristlebird (*D. broadbenti*), contrasting them with those of the Mangrove Warbler (*Gerygone levigaster*) and Helmeted Honeyeater (*Lichenostomus melanops cassidix*). The coupling of the museum's skins with typical members' exhibits made the former topical and accessible, and lent authority to the latter. His best known book was *The Birds of Sydney*, co-authored with Arnold McGill (Hindwood and McGill 1958). Hindwood created a personal card catalogue of bird sightings arranged according to the order of the 1926 Checklist. In it he included clippings from newspapers and letters and notes from correspondents. His catalogue was the heart of a major popular network for Sydney "birdos" to exchange information.² When he died in 1971, the artist Ern Hoskin (who illustrated *The Birds of Sydney*) continued Hindwood's field records as the "Keith Hindwood Memorial Bird Recording Service" and published a revised version of *The Birds of Sydney* in 1991. This valuable archive spanning most of the 20th century, is now held by the Mitchell Library, State Library of New South Wales.

Tasmania's museum also had an honorary ornithologist, nature writer Michael Sharland, who chaired several practical bird clubs in his home state, Tasmania, and also in Melbourne and Sydney, when he lived in those states, as well as working for the RAOU. He was conscious that great scientists who are sometimes poor public communicators, could make "science" seem too dispassionate for the organization.

In Western Australia, the leading ornithologist, Dominic Serventy (1904–1988) joined the RAOU as a boy, and remained an enthusiastic supporter all his life. In 1947–1949, he was RAOU President. He also edited the *Western Australian Naturalist* (from 1947–1980). He was a professional scientist, qualified with a doctorate from Cambridge University in the 1930s, who engaged with, valued, and drew on independent private endeavour and never stopped being an amateur (in

the literal sense, a lover of birds) himself. In one of his Presidential addresses to RAOU, he stated that “academic training is not essential for effective work in taxonomy. It is a field of biological endeavour, which demands a sagacity which formal training alone cannot implant” (Serventy 1950:263). It was this “sagacity” that he cultivated, wherever he found it.

Like Keith Hindwood, Serventy kept extensive files on birds with correspondence and observations. He was in constant communication with ornithologists all over the world, as well as with pastoralists and itinerant workers in remote parts of his state. Frequently Serventy personally hosted visitors coming to undertake international expeditions to Australia (such as the Harold Hall expeditions from the British Museum, 1962-1968) (Robin 2001a:200–202). He also maintained correspondence with organizations including the Percy Fitzpatrick Institute for Ornithology in Cape Town, South Africa, over decades (D. Serventy Archives). Some of his international connections were enabled by his work at CSIRO in fisheries research, but most were about his own personal connections and the fact that he was regarded for much of



Figure 14. Shearwater research continues at Brush Island Nature Reserve (off the New South Wales coast south of Sydney) with Birds Australia Southern NSW and ACT (BASNA). Dean Portelli reaches into the burrow. Photo: Nicolas Carlile (Birds Australia).

his life as the pre-eminent Western Australian naturalist. His most important longitudinal scientific research was, however, in the eastern states—where he studied the migration and breeding patterns of Short-tailed shearwaters (*Puffinus tenuirostris*) in Bass Strait, from 1947 until his retirement (V. Serventy 1996, Robin 2001a:146-149) (Figure 14). Serventy made two major contributions to ornithology that demonstrated practically his capacity to bridge the worlds of amateur ornithology and international professional science. The first was that he materially assisted the elderly H. M. Whittell to publish his life's work, *The Literature of Australian Birds: A History and a Bibliography of Australian Ornithology* (Whittell 1954). He also wrote *Birds of Western Australia* (producing five editions between 1948 and 1976) with Whittell (Serventy and Whittell 1976). Under Serventy's guidance, *Birds of Western Australia* expanded considerably, drawing extensively on the correspondence of amateur observers all over the state. It remains the best state-based handbook of birds in Australia.

The International Ornithological Congress.—Serventy and his international networks were also instrumental in bringing the XVIth International Ornithological Congress (IOC) to Canberra in 1974, the first ever IOC in the southern hemisphere. Serventy was for many years Australia's only representative on the International Ornithological Committee (known informally as the Committee of One Hundred), but in 1962 he lobbied successfully for Harry Frith and Jock Marshall to be added to the group. Harry Frith, the Chief of the Wildlife Research division of CSIRO became the Australian General Secretary of the IOC, when in 1966 it was decided to hold the meeting in Australia (Robin 2001b). Ernst Mayr's presidential address at the XIIIth IOC in Ithaca, New York in 1962, on the place of ornithology in the New Biology, inspired many to see the relevance of southern hemisphere birds in international thinking. Mayr, Harvard professor and Director of the Agassiz Museum of Comparative Zoology, was revising the systematics of the birds of Oceania at the time and he drew international attention to Australia in particular, mentioning RAOU ornithologists Keith Hindwood and Allen Keast by name in his lecture (Mayr 1963). In addition to the Australians and Mayr, the permanent committee of IOC included Klaus Immelmann (University of Bielefeld, West Germany), Don Farner (Washington State University) and Charles Sibley (Peabody

Museum, Yale University), all of whom had substantial research interests in Australian avifauna and traveled in Australia.

In informed international circles, there was considerable anxiety that the RAOU was not really sufficiently professional to lead IOC in Australia. The RAOU had been through a very difficult period in the 1960s, with standards in *Emu* falling significantly, and many long-standing members resigning (Robin 2001a:209-229). Behind the scenes, Serventy reassured internationals and urged locals to involve the RAOU. The practical Frith forged a partnership with the RAOU using his own base as a Fellow of the Australian Academy of Science, and as a senior CSIRO scientist, to ensure scientific credentials were impeccable, but also to ensure that local ornithologists felt part of the great event and were available and enthusiastic about leading the field trips that were essential to attracting the internationals to such a distant and expensive congress (Robin 2001b).

The RAOU and the Australian Academy of Science each raised \$10,000 towards the conference, the RAOU from private donations and the Academy from the Australian government. The cost of bringing international keynote speakers to Australia was very significant. But the real burden of planning fell on Frith's Wildlife Research division of CSIRO. Neither the Academy (with few paid staff) nor the RAOU (with none) could have shouldered the huge administrative load. The IOC cost many staff their weekends and evenings. Not just officers, but also their families, worked hard throughout the four years leading up to the Congress to defend the scientific reputation of the Division and of Australia. Congresses traditionally consisted of two programs, the scientific symposia and the general program. The standards and subjects of the scientific program were anxiously guarded by the International Ornithological Committee, while the general program was more inclusive of amateurs and encompassed any number of subjects. Frith chaired the key Scientific Program Committee, and CSIRO staff accounted for most of its membership. But none of this would have been possible without the strong support of Jean Dorst, the (French) President of IOC for the Australian Congress. Dorst regularly dealt with the Committee of One Hundred, the vast majority of whom came from Europe, and lent his support to an Australian-driven scientific program, with a southern hemisphere bias (Robin 2001b). As well as choosing a suitable subject for his presidential address—the history of avian



Figure 15. International collaboration continues. The Australasian Wader Studies Group, one of Birds Australia's special interest groups, has a focus on the international conservation of the East Asia-Australasia Flyway, and works collaboratively with international partners including Birds Korea, pictured here in 2008. Photo: Ken Gosbell (Birds Australia).

diversity in the “bird continent” (South America)—he spent a good deal of time before the congress lobbying Europeans and North Americans and making them feel suitably consulted (Dorst 1976). Dorst was a tactful man, and smoothed the feathers sometimes ruffled by the brusque Frith. Dorst personally tackled “the tyranny of distance” by coming to Australia with his wife Éliane in August 1971 to be present at the first meeting of the Scientific Program Committee.

The wholehearted support of Jean Dorst, the IOC President, enabled Frith to slant the program towards Southern Hemisphere issues closest to his heart. The topics of symposia reflected the strengths of southern hemisphere ornithology, both within Australia and internationally, and included much discussion of Gondwanan groups and southern radiations (Robin 2001b) (Figure 15). Other themes included arid zone ornithology, led by Western Australian CSIRO emu-expert Stephen Davies and “Migration and Movements in the Southern Continents,” a symposium arranged by M. K. (Bunty) Rowan, Dominic

Serventy's chief correspondent at the Percy Fitzpatrick Institute in South Africa.

Serventy had also ensured that the RAOU would have a suitable President at the time of the IOC. He took the experienced bird-bander Pauline Reilly out to work with him on the shearwaters at Fisher Island, "And I spent sixteen days with Dom telling me that I must be president," Reilly recalled (Robin 2001a:226). She finally agreed on condition that Serventy would do the "terrifying" Presidential Address for the IOC, a promise that his stammer prevented him from keeping. Reilly had her own reasons to support the IOC. She was concerned that the RAOU was not doing enough fieldwork (especially banding) to justify its status as the national organization. Reilly's mission for the RAOU was to develop systematic ways of observing birds so that results could be shared across the continent and become cumulative. After the debates about amateur and professional science that had rocked the Union in the 1960s, she sought projects larger than the local that would engage and interest amateurs and also be useful to professional scientists. In 1964, Stephen Marchant had initiated a Nest Record Scheme to record detailed information about individual birds' nesting events. It was modeled on the scheme promoted by the British Trust for Ornithology, which had already spread successfully to many European countries, North America, South Africa, Rhodesia (now Zimbabwe), and New Zealand. The scheme drew together independent and previously unpublished observations of breeding records from all over the country. Marchant noted that it had the added benefit of diverting "interest from the collection of eggs to the recording of what happens to them in nature" (Marchant 1964:424). This national project was important, but limited to less than 100 loyal observers.

Pauline Reilly was a pioneering penguin bander (she introduced flipper banding). She knew about organizing volunteers and the excitement of practical bird-handling through banding and observatory training, but she was also aware that quality research work cost money, even if the labour was free (Reilly 1973:203-5). She used the IOC as an opportunity to have preliminary discussions towards what would become the first *Atlas of Australian Birds* (Blakers et al. 1984). The IOC brought to Australia people with experience of coordinating amateurs in survey projects in Sweden, Britain, and North America, and she and John Disney of the Australian Museum scheduled a special meeting to discuss the issue with these people. The incidental benefit of the IOC to

the RAOU was the renewed cooperation it enabled between the scientific community and amateur ornithologists after a decade of animosity in Australia. International influences enabled the RAOU to get its own house in order and move into a more professional era. Pauline Reilly argued for a younger, professional person to succeed her in the office of President. She had been impressed by Stephen Davies' energy and organizational skills during the RAOU camp-out at Wanjarri Station in the Western Australian desert country in 1970. The IOC, where she saw Davies working with international peers, confirmed this choice (Gorringe-Smith 1995). He agreed to take over from Reilly at the end of her term and served as President from 1975-1978. In 1985, he was appointed as the first professional Director of the RAOU, serving (part-time, commuting from Western Australia) until Philip Moors took on the role full-time in 1989.

The Atlas of Australian Birds.—The first atlas project in Pauline Reilly's words, really "grabbed people." "Everybody said, 'Oh there's no way you'll get enough people to do that. There are only about a thousand people who are bird watchers or ornithologists in Australia.' Well, we ended up with three thousand!" (Gorringe-Smith 1995). In the period from 1972 when Pauline Reilly took over as President, until 1983, the end of the presidential term of Norman Wettenhall, the medical doctor and philanthropist who had raised the money for the IOC, RAOU membership more than doubled from about 850 to over 2000, such was the popularity of atlassing. *The Atlas of Australian Birds* (Blakers et al. 1984) marked a new era for RAOU. It recorded wide-ranging biogeographical information for the science and conservation of birds in Australia, a great project for bird observers to work together co-operatively and the benchmarks for further work over the ensuing years.

The Handbook.—The success of the Atlas opened the way for an even more ambitious project, the *Handbook of Australian, New Zealand and Antarctic Birds* (HANZAB) (HANZAB 1990-2006). A sub-committee was established for this purpose in 1980. Its initial aim was "to bring together the entire knowledge of all species occurring in the area and . . . to foster and encourage ornithological research in Australia" (Blakers 1982b). The model was *Birds of the Western Palearctic* (Cramp 1977-1994). All of the 952 species ever recorded in the region, including extinct species, introduced birds, and rare visitors

to offshore islands are characterized in detail in the seven volumes (nine books) of *HANZAB* published from 1990 to 2006, under the editorial guidance of Stephen Marchant, Peter Higgins, J. N. Davies, Stephen Davies, John Peter, and W. K. Steele. Jeff Davies was the (major) artist (line drawings were supplied by others) and Sid Cowling the cartographer for the project and both also served as co-editors of volumes. For all breeding species, there was information on field identification, habitat, distribution and population, relations with humans, movements, food, social organization, social behaviour, voice, breeding, and plumage. Stephen Marchant defined the scope of the whole project. *HANZAB* was researched and written by professional ornithologists, some volunteers, and some employed by RAOU/Birds Australia funded by private sponsorship (Hamilton 2005).

HANZAB was a major professional initiative for a relatively small organization to undertake and sponsor through members, and the publication of its final volumes in 2006 was a great achievement. It was an eight million dollar investment. But after nearly two decades of employing avian biologists dedicated to this task, Birds Australia has shifted its focus to conservation and membership matters, and focused less on scientific ones.

Science is now more often project-based and funded, often conducted in partnership with other interested parties (including the Australian government through Natural Heritage Trust and major international bodies such as BirdLife International). Best of all are projects like the successful *Birds in Backyards* initiative (established 1999) that combine local observation, scientific compilation, and useful outcomes for conservation. The journal *Emu* has maintained high scientific standards, in partnership with CSIRO Publishing (*Emu* 1901–). Other research initiatives include sponsorship of postgraduate student research in ornithology (the Stuart Leslie and Allen Keast Bird Research Awards) funded by private donors. The emphasis on “conservation through knowledge” has sharpened, and there are many links between “research” activities and “conservation” activities including the *State of Australia’s Birds* (Olsen and Weston 2004–2009, Paton and O’Connor 2010, Kirkwood and O’Connor 2010).

Australasian Ornithological Congress.—From 1996, regular southern hemisphere ornithological congresses were initiated promoting further communication among southern hemisphere

scientists (and those from elsewhere with an interest in birds of the region). The first two congresses held in Albany (1996) and Brisbane at Griffith University (2000) were Southern Hemisphere Ornithological Congresses (SHOC). The first Australasian Ornithological Congress (AOC) was in Bathurst NSW in 2001 hosted by Birds Australia and Charles Sturt University, with support from the Ornithological Society of New Zealand Union. Since then, AOCs have been held in 2005 in Blenheim New Zealand and in 2009 in Armidale New South Wales. Auckland New Zealand will host AOC2013. The 2009 theme was “the collaboration between volunteers collecting information in the field and scientists analysing such data, to increase our knowledge of birds and their conservation” (Birds Australia 2009). The meeting brought together the atlassing and other BA initiatives with the many postgraduate students in Australian and New Zealand universities whose projects expand the knowledge of birds. Some of these projects (and many of those of their supervisors) are only possible because of the large data sets generated by willing volunteers. The boundary between science and conservation continues to be blurred as scientists are able to use the voluntary work of people concerned about the conservation of birds for scientific purposes. Cunningham and Olsen (2009) have developed a statistical methodology for rigorous treatment of observations, specifically based on the vast data-sets generated by Birds Australia volunteer work.

PART 3: CONSERVATION INITIATIVES

Finding common ground.—Conservation initiatives often arose from other activities, as was the case with the question of the plumage trade in the pre-World War I era, and the education of children against egg-collecting, which was undertaken by the Gould League. After the 1920s, which had been dominated by questions of taxonomy and the *Checklist*, the 1930s brought the RAOU a conservation-minded President, the first woman and only the second New Zealander to take on the task. Perrine Moncrieff, later author of *New Zealand Birds and How to Identify Them* (Moncrieff 1957) was voted President for from 1932-1933, bringing with her much experience from the Royal Forest and Bird Protection Society of New Zealand (now Forest and Bird), which had been established in 1923. Moncrieff and her husband

Malcolm had bought land for the New Zealand government to keep as public reserves. She was a lifetime campaigner for National Parks. In a sense, her vision was ahead of her time, being rather closer to the RAOU's conservation initiatives in the late 1990s, especially the purchase of land for bird reserves. In Australia, the constitution dictated natural resources and environment were state matters, so national parks were managed by the states, and lobby groups for national parks were state-based. The Queensland National Parks Association was particularly active in the 1930s, and most states had National Parks Associations by the 1960s (Robin 1994). But it was more difficult for a national organization like RAOU to be involved in lobbying for national parks, as the rules were different in each state. The best opportunities came through annual campouts, where the RAOU visited different states most years for a congress and a campout from 1904 onwards, except during war-times (Robin 2001a:408–411). Often the local organizing committee would use the visit of the RAOU to campaign for conservation initiatives with their state government (Figure 16).

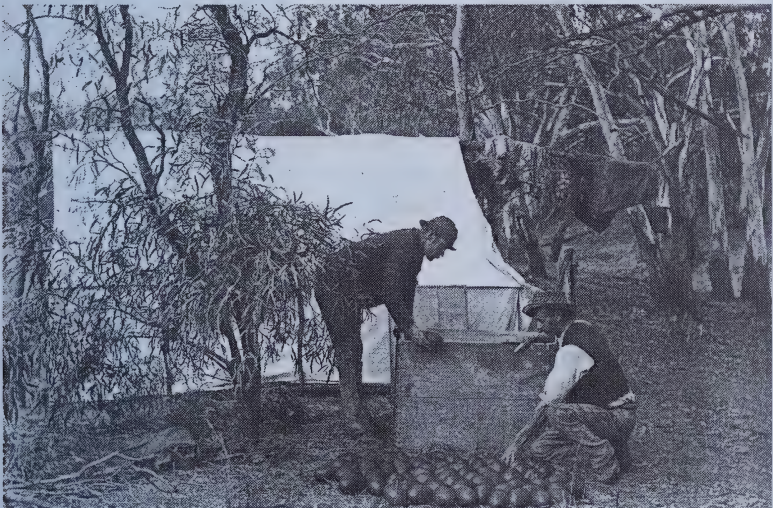


Figure 16. Conservation concerns have changed over time. Unidentified collectors packing Emu eggs at their camp, early 20th century. Emu eggs were prized for carving. At this time carved eggs often appeared in art galleries and private art collections. Photo A. J. Campbell (NLA 24750402). <http://nla.gov.au/nla.pic-an24750402>

The most difficult conservation issues to resolve were those that divided the ornithological community itself. From the early 1920s, collecting birds for cabinets (rather than museums or authorized scientific institutions) was “against RAOU policy.” From 1923, the union resolved not to collect birds at official camp-outs, although many of its members continued to do so privately. The RAOU was not supportive of shooting for sport, but when the shooting was for science, the policy was grey. Egg collecting was more difficult to stop. Campouts traditionally were held in spring, when the nesting season was at its peak. Dom Serventy recalled the “orgy of egg collecting” at camp-outs in the 1920s and 30s: “In the evening one heard continuous gurgling noises while eggs of waterfowl were being blown. Every now and then an oologist would stagger out of a tent to discard a bucketful of yolk and water” (Serventy 1972:48). Many members were appalled to watch fellow members shooting birds or indulging in egg-collecting sprees—and never returned to either the camp-outs or the RAOU. Many moved over to the Bird Observers’ Club, revived in 1927 after losing momentum during war years, which was explicit on this point: “We are opposed to any interference with the birds or their nests. We appreciate that museum specimens are essential but we detest the cage that swings in the kitchen” (BOC 1931). Nonetheless, their meetings often featured exhibits of skins and eggs from private, as well as public collections.

Collecting and conserving.—The delicate issue of collecting (shooting) birds for science came to a head at the 1935 camp-out in Marlo in Victoria. George Mack, curator at the National Museum of Victoria for twelve years, was an active collector for the museum’s public and research collections. He was also a prominent member of RAOU. He arrived at the camp-out armed with scientific collecting permits and a gun and, it seems, a point to make. But the manner in which he made it was divisive to the organization. A Scarlet Robin (*Petroica multicolor*) had a nest just near the main camp site and had charmed the assembled group at breakfast each day. One day, Mack took out his rifle and ruthlessly shot the bird right in front of everybody as they watched (Anonymous 1935). This was hardly “science,” nor in the spirit of the permit. The controversial specimen was never deposited in the museum. The New South Wales members, often at odds with the dominant Victorian leadership, were horrified by the incident. All ten delegates left the camp in disgust, led by journalist Michael Sharland,

who ensured that reports of the incident appeared in the major newspapers *Sydney Morning Herald*, *Argus*, *Sydney Sun* and *Melbourne Herald* (Bryant 1936:219). The 1935 congress, which followed the Marlo camp-out, dealt with the negative publicity by resolving that “no collecting be permitted at Camps-out and that any member disregarding the rule be not permitted to remain in camp,” but there were a number of abstentions among the voters (RAOU 1936).

The incident marked the beginning of a period of “doldrums” for the RAOU, when both conservation and science were sacrificed to bitter in-fighting and many members left the organization altogether. The war years did not help and the *Emu* struggled to maintain standards. Most importantly, the members had lost their sense of fun. Their relaxing hobby had become intense, political, and too little about birds. The first Atlas project turned this around. As the brochure for atlasers declared: “Above all, ENJOY IT” (RAOU Archives).

Atlasing.—As early as 1948, Arnold McGill had bemoaned the lack of information on the geographical range of Australian birds, which he described as “the most neglected” aspect of Australian ornithology (McGill 1948). The RAOU was slow to take up this challenge. The inspiration for the *Atlas of Australian Birds* came from experiences of British atlasing and the New Zealand Distribution Mapping Scheme (Truran and Horey unpublished). The project began with a trial in the observer-rich area of 5,000 square miles (8,000 square kilometres) that included the Australian Capital Territory and the Eurobodalla Shire on the south coast of New South Wales, near Canberra. Margaret Blakers, the Atlas Field Officer, commented later, “It was a great project for people to get involved with. The reason people got involved was because it was adventurous, but also something you could do at home. You could do as much or as little as you wanted” (Blakers, pers. com.). Communication was provided through a “monthly newsletter,” and atlasers recorded presence or absence of species, and evidence of breeding in four categories. There were many European precedents for the scheme, but Australia demanded a larger scale, with fewer observers, so organizers had to be flexible about the system:

“The immensity of the continent, the difficulty of access to many parts of it, the concentration of ornithologists in only a fraction of it, and the preparedness (or otherwise) of amateur

ornithologists to organize and participate in such a scheme were all factors . . . [that] would have a bearing on the success of the project" (Reilly et al. unpublished:1).

The national atlas began with an appeal to members in March 1976 to collate their own (historical) records by standard one-degree squares on field cards. These were co-ordinated by regional organizers. A short-term grant from the Australian Biological Resources Interim Study enabled Peter Curry to be appointed as the RAOU's first paid staff member, with the task of compiling historical information from published sources for the Atlas, but by the time the project was to start, he had moved to a more secure job in Western Australia. With only months to go, Margaret Blakers was appointed Atlas Field Officer, on a six-month contract, to do what became a seven-year job. "It was always insecure, but . . . once you've started, you have to finish it—so you've got to find the money from somewhere," she reflected. "Within [a matter of months] . . . we found a computer programmer, we designed the form, we got the forms printed and we designed the whole mechanism of the project with regional organizers" (Blakers interview 17 Feb 2000). By 1 January, with the help of a remarkable volunteer, Bob Rowlands from the CSIRO, they had access to a computer. In this era before personal computers, Rowlands' computer filled a whole room. By the time the atlas project had finished, the computer revolution had come and the data were in a form to be transferred to newer technologies, a task undertaken by Simon Bennett. There were no maps for the whole continent giving a detailed coverage, and no Global Positioning Systems (GPS) to give precise locations. All the maps had to be vetted by hand by Shane Parker, John McKean, and Henry Nix (Blakers 1982b:14).

The success of the Atlas depended on the "takeover" of the whole organization, including annual camp-outs. Sites at Ooldea on the Nullarbor Plain (26 August–4 September 1979) and Top Springs, Northern Territory (26 August–5 September 1981) were chosen for camp-outs because they were near blanks on the map. The Top Springs camp-out provided a base for thirteen one-degree blocks, five of which were visited for the first time. Norman Wettenhall, RAOU president during this critical period, recalled that "people went all over Australia in their own time and their own funding to every corner of the 800 squares of the country" (Wettenhall interview 19 March 1998). The

rising popularity of four-wheel-drive vehicles made much of the remote work possible. The RAOU attracted support from government conservation agencies, private mining companies, generous individuals, and even the army. As Margaret Blakers commented: "It was the perfect project . . . because it was a treasure hunt. You were forcing people to go to places where they wouldn't otherwise go, and they found all kinds of things that they had no idea about. Not just birds, but nice places that are off the beaten track" (Blakers interview 17 February 2000).

On 12 July 1984, in the Audubon Room at the University of Melbourne, Robyn Williams of the Australian Broadcasting Commission's *Science Show* launched the *Atlas of Australian Birds*, presenting Margaret Blakers with a leather-bound copy (Blakers et al. 1984). The book contained 3.5 million records, based on 190,500 bird-lists collected by more than 3,000 ornithologists, including historical records in three classes: before 1900, 1901–1950 and 1951–1976. Records were accurate at least to a one-degree block. Conservation managers were particularly keen to use Atlas material, and their needs shaped the second national Atlas project from 1998–2002 (Barrett et al. 2003).

Working with governments.—The constant demand for the distribution information encouraged another project, this time with more ambitious aims, including noting changes in the twenty-year period since the previous atlas data had been collected, and recording abundance statistics. Government departments wanted to use the new work to audit and evaluate Bushcare (a revegetation project) and for the management of Ramsar sites (wetlands of international significance). Regional and seasonal variations were also included for the second national atlas. The Natural Heritage Trust funded much of the work "because it is seen to be a very good program to demonstrate the changes in landscape . . . Birds are a marked indicator species," Birds Australia Councilor (later President 2005–2010), Alison Russell-French commented (Russell-French interview 2 June 2000). Since the second Atlas was completed, monitoring has continued, and the online program "Birdata" has been developed, using information from both atlases (Birdata online).

Contributing to the National Reserve System.—Following the 1992 Earth Summit (the United Nations Conference on Economics and

Development in Rio de Janeiro, 3-14 June 1992), the Australian government reassessed its national conservation reserves and the systems by which they were managed. National parks and reserves had been managed exclusively by the states until this time, but because of new international conventions, it established a national network of state-based, community-based, and Indigenous reserves, making biodiversity a national concern. In the decade from 1997 to 2007, the National Reserve System program invested more than \$89 million to help the states, territories, local government, conservation organizations, and private landholders add land to the reserve system. Supported by the Natural Heritage Trust (established 1997), which sponsored land management programs and knowledge-based initiatives (including Birds Australia's new *Atlas*, Barrett et al. 2003), the Natural Reserve System (*Natural Heritage Trust of Australia Act* 1997, No. 76)



Figure 17. Birds Australia's own Gluepot Reserve in South Australia was the destination for the 2008 Congress and Campout. Between fire management, surveying Malleefowl (*Leipoa ocellata*) nests and archaeological digs, members found time for some old-fashioned bird watching. Photo: Jen Sutfin (Birds Australia).

promoted partnerships between philanthropic groups and community organizations, and created opportunities to buy land for conservation. Birds Australia's first venture in this direction was the Gluepot Nature Reserve in the South Australian Mallee country (Figure 17). Because of the new government guidelines, Birds Australia created a new Report Series, and the first report was *Site Assessment Criteria for Land Acquisition by Birds Australia* was published in 1997. The criteria were primarily designed to meet conservation concerns, and were "intentionally skewed towards sites that support nationally and regionally threatened bird species and a diverse bird assemblage" (Barrett 1997:14). In the United States, the United Kingdom, and elsewhere there had been a long history of private conservation initiatives by organizations such as the Audubon Society and the Royal Society for the Protection of Birds, but this was a relatively new development in Australia. New Organizations Bush Heritage Australia and Australian Wildlife Conservancy (both established in 1991, with land purchases in Tasmania and southwestern Western Australia, respectively), were the first Australian groups to buy "land for conservation." Birds Australia was the first with land purchases that had a specific focus on birds, and Gluepot was one of the largest private reserves at the time of purchase, although there are now many bigger ones. Following the successful acquisition of Gluepot in 1997, a second, much larger property, Newhaven, was purchased in the Northern Territory in 2000, which is now managed by Australian Wildlife Conservancy.

Birds Australia's other great conservation initiative, funded in partnership with the mining corporation Rio Tinto (Agreement 3 December 2006), are the 314 sites designated "Important Bird Areas." Identifying globally important conservation sites using the Birddata database and the invaluable data held by local experts, and nominating them to Birdlife International as places for protection has been one of the contributions of RAOU/Birds Australia to the global conservation of birds.

Conclusion: History in the Present.—The appreciation of birds and the celebration of bird observing has enriched members for a hundred and ten years of RAOU history. It is still core business in the twenty-first century, with strong support for "twitchathons," popular and scientific bird projects and conservation work. Conservation through

Knowledge has renewed importance, but “love of birds” is still the motivation. Over the last two decades, through initiatives like the National Reserve System, professional science and natural resource management have developed a new community-mindedness, seeking out partnerships. The RAOU has become an important partner not only because it is a community-based organization, but because it has national reach. RAOU/Birds Australia has been enabled by partnerships with government, with non-government organizations, and with corporate sponsors to return to its grassroots and provide a supporting rather than a leading role for major conservation projects and for avian biology. These dimensions will be strengthened in the new organization BirdLife Australia, as the networks built by BOCA are added to the team. Increasingly BirdLife Australia will sponsor projects that focus on the interface between science and practical conservation, as both its forebears did. It builds on volunteer skills with atlas work, and in partnerships with avian biologists like David Paton at Adelaide University and David Lindenmayer at the Australian National University, who have large-scale, long term projects that depend on excellent bird observers (Lindenmayer et al. 1997, Paton and O'Connor 2010).

The Emu: Austral Ornithology is a high quality scientific journal for the 21st century, with a good international readership. RAOU's support for this journal over eleven decades is its greatest contribution to conservation and knowledge. *Emu's* long history is its great strength. Its pages still invite the appreciation of birds, bird observation and the history of ideas.

ENDNOTES

- ¹ Graeme Hamilton, Birds Australia's Chief Executive Officer (and CEO of BirdLife Australia from 2012), identified this motto as 'capturing the aims and emphasis of the organization' (interview with the author, 25 February 2010).
- ² Note that while bird observers in most parts of the world are known as 'birders', in Australia the term is 'birdos'. It is possibly derived from Bird O's, a shortening of 'bird observers'.

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Depletion of the avifauna of the North Island of New Zealand: An 1840s perspective

*Ian Abbott**

ABSTRACT.—In 1848 the New Zealand naturalist William Colenso (1811–1899) discussed in a letter to Lord Derby the avifauna of the North Island, and noted changes personally observed between 1834 and 1848 and changes before 1834 that were told to him by Maori people. This letter, of some 4,000 words and apparently unknown to ornithologists, is published for the first time with annotations intended to assist the modern reader. Although declines were a continuing process that had been operating before 1834, it appears that nine bird species had experienced recent precipitous declines. Early travel literature for North Island is reviewed in particular for references to introduced animals. Based on this information, I propose a hypothesis that early declines in abundance and geographical range of several bird species and the Kiore (*Rattus exulans*) were caused by introduced diseases. Avian disease (possibly from the first large introduction of poultry in 1814) should not be underestimated as an explanation of the first wave of bird declines associated with European settlement, preceding the second wave resulting from predation by introduced rats (Brown Rat *Rattus norvegicus* and Black Rat *R. rattus*). Reasons for this are discussed.

Several years ago I was searching for information in the State Library of Western Australia about John Gilbert's collecting activities in Western Australia. The most comprehensive and potentially relevant archival resource available there was microfilm resulting from the Australian Joint Copying Project (AJCP, 1945–1993), the aim of which was to make available in Australia unpublished 18th and 19th century material preserved in libraries and archives in Britain and relevant to Australia. Gilbert's collecting effort in Western Australia was financed by John Gould (Fisher 2008), who greatly advanced knowledge of the Australian avifauna during the period 1838–1865 (Gould 1865). Gould frequently corresponded with Lord Derby of Knowsley Hall, Liverpool

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(Fisher 2002), and offered choice specimens for sale or exchange to the Earl. The Derby and Gould papers, housed at Cambridge University, were copied by the AJCP.

In the Derby papers I chanced upon a 15 page, hand-written letter by William Colenso of Cape Kidnappers, Hawke Bay, North Island, New Zealand to Lord Derby, dated 19 January 1848. The index to correspondence simply stated “interest in New Zealand natural history; disappearance of many species of animals and plants; difficulty of obtaining living specimens of large birds; reluctance of older natives to help collectors” (Colenso 1848).

It is clear from Colenso’s letter that Lord Derby had written to Colenso in November 1847 requesting specimens of birds to be collected and sent (alive or dead) to him from New Zealand. However, I have not found Lord Derby’s letter. As Lord Derby died in 1851, it appears unlikely that there was any further correspondence.¹

In this paper I have reproduced Colenso’s letter in its entirety, and have not corrected any of his idiosyncratic spelling and punctuation, use of fonts, and inconsistent use of parentheses. The long s has been indicated by fs. For the convenience of readers I have annotated the letter with appropriate explanations in [brackets] and as end notes. Currently accepted names of species mentioned have been sourced from HANZAB (1990-2006). Numbers in brackets indicate the start of a new page in the letter.

No reference by ornithologists or historians to Colenso’s letter has been found² in standard works or reviews of knowledge (Buller 1888, Oliver 1955, Phillipps 1963, Williams 1973, HANZAB 1990-2006, Worthy and Holdaway 2002). A detailed compendium of early New Zealand literature relating to birds (Oliver 1968) also makes no mention of the letter. Excluding papers on moa, Colenso published very little on birds (Colenso 1843, 1844, 1878, 1886, 1888, 1890), and rarely recorded observations of birds in his (unpublished) travel journals (Bagnall and Petersen 1948).

The objectives of this paper are twofold: First, to make known Colenso’s letter of 1848; and second, to discuss the process of decline and extinction of bird species on the North Island of New Zealand in the light of the insights provided by the letter and other contemporary accounts.

WHO WAS WILLIAM COLENZO?

Born in Cornwall, England in 1811, Colenso trained as a printer's apprentice. He was well educated, evidenced by his familiarity with Latin and French, and his fluent use of English (Colenso 1842a, 1842b, 1843, 1844). These publications reveal curiosity about, and interest in, the natural world; well-developed observational skills; and a strong capacity to reason deductively, conceptualize, formulate hypotheses, and marshal and sift evidence in an objective manner. These abilities place him as more than just an enthusiastic amateur, as so regarded by Clark and Kelly (1994). By the end of his life, Colenso was regarded as "an authority upon the natural history" of New Zealand (Anonymous 1899a) and as "the Nestor of science" in New Zealand (J. D. H. 1904).

Colenso arrived in New Zealand at the Bay of Islands in 1834 as a printer and missionary for the Church Missionary Society. By 1837 he had mastered the Maori language (Anonymous 1899b). From 1838 he travelled extensively in the North Island in the company of Maori guides for the purpose of ministering Christianity to Maori people in their villages (Bagnall and Petersen 1948). Localities visited in 1837-1838 and 1841-1842 are noted in Colenso (1842a, 1842b, 1843, 1844), those visited in 1843, 1844 and 1847 and later years are outlined by Cheeseman (1906), and others are cited (without date) in Hooker (1853, 1855). Bagnall and Petersen (1948) provide the most detailed account (with maps) of Colenso's extensive travels. Ordained as deacon in 1844, Colenso opened a new mission at Hawke Bay and travelled widely into adjacent areas (Bagnall and Petersen 1948).

Colenso is best known as a botanical collector, with specimens of > 900 species of plants, cryptogams, fungi, and algae cited in Hooker (1853, 1855). Joseph D. Hooker listed 41 species named by Colenso but accepted only 12 as valid (Hooker 1853, 1855). Colenso also understood geological concepts (Colenso 1843, Bagnall and Petersen 1948). He met Charles Darwin during the visit of HMS Beagle in 1835, Allan Cunningham in 1838, and Joseph Hooker during the visit of HMS Erebus in 1841 (Bagnall and Petersen 1948). He helped bring the moa to scientific attention (Colenso 1843, Owen 1846). Colenso was the first of three dedicatees of the Flora published in two parts by Hooker (1853, 1855). Hooker later noted that Colenso had discovered more "new and interesting plants in New Zealand than any botanist since

Banks and Solander,” and regarded him as “the foremost New Zealand botanical explorer” (Hooker 1864a:11). Colenso was awarded a medal in 1865 for two essays (on botany and Maori people) written for the New Zealand Exhibition (Bagnall and Petersen 1948). He contributed 209 Maori names for plant species to the botanical synthesis of Hooker (1867), who praised Colenso thus: “whose intimate knowledge of the botany and language of New Zealand guarantees their accuracy.”

Colenso was elected FLS (Fellow of the Linnean Society, London) in 1865 (Anonymous 1899b) and FRS³ (Fellow of the Royal Society, London) in 1886 (Royal Society 2011). In later life he was a prolific writer, publishing 102 articles in the *Transactions and Proceedings of the New Zealand Institute* between 1877 and 1899 (the year of his death). Although 59 of these papers were on botany (Cheeseman 1906), his diverse output also included papers on Maori culture, herpetology, and entomology. By the end of his life, Colenso had described and named 429 plant species but only 21 of these were regarded as valid⁴ (Cheeseman 1906).

THE LETTER

“Mifision Station, near Cape Kidnapper,
Hawke’s Bay, New Zealand, January 19, 1848.

My Lord

At no period in my whole life⁵ have I ever felt so utterly inadequate to answering a letter as at present, when (an opportunity offering of sending letters to our Capital – a thing of rare occurrence,) I endeavor to reply to your Lordship’s very kind and condescending Letter of Feb^y 11/47, which only reached me a short time ago⁶.

It is not, however, from your Lordship’s being an entire stranger to me – nor, from a person in a humble sphere of life like myself having to address the head of the noble and ancient house of Stanley – (that I now feel unequal to the task; but, because), while my own ardent inclinations would willingly lead me to lay hold of every opportunity with my utmost ability in carrying out your Lordship’s requests, my peculiar situation, heavy charges, and increasing infirmities, I

regret (**truly** regret) to say, too surely preclude my doing so.

And, in order, my Lord, that you may know somewhat of the truth of the foregoing Sentence, it is necessary I should briefly explain myself for your Lordship's satisfaction.

When, fourteen years ago, I came to N. Zealand, I landed fully determined to do all I could towards elucidating the Natural Features of this (then) little-known Country – and particularly its Ornithology, Conchology, and Flora: I procured cages & pens, and, in course of time, obtained several living specimens of the genera *Falco*, *Athene*⁷, *Nestor*, *Platycercus* [*Cyanoramphus*], *Apteryx*, *Botaurus*, *Porphyrion*, [2] *Aptenodytes* [*Eudyptula*], *Larus*, *Anas*, *Columba* [*Hemiphaga*], *Halcyon* [*Todiramphus*], or ?*Dacelo*⁸, *Philedon* [*Anthornis*], *Anthornis*, *Rhipidura*, *Miro* [*Petroica*], *Alauda* [*Anthus*], &c., but could never succeed – spite of all my attention – in keeping them alive. Or if I did, (as in the case with the genera, *Nestor*, *Anas*, *Aptenodytes*, & *Larus*,) they invariably escaped. Disappointed, I, for a time, persevered; but the growing difficulty of getting specimens, and the increase of duties, caused me to abandon the attempt of procuring and keeping living specimens, and to direct my attention to the preserving the skins of any rare species I might happen to obtain. This, too, in process of time, I was obliged to give up, through the progressive accumulation of labour. And, finally, to confine myself to the collecting of plants and shells, which I still could do, even while travelling, without any ways interfering with my duties.

But, my Lord, on my being stationed here [North Island of New Zealand], in this new and extensive field, larger than some English Counties, extending (by chart) over more than 2° of lat., and that, too, without roads, far off from civilized man, and, consequently, from help, among a rude and scattered people, remnants of tribes of renown, who, but for my influence and vigilance (under God) would soon be at deadly feud among themselves, among whom I am not only in the Capacity of Minister, but of Doctor, Schoolmaster, Magistrate, Peace-maker, &c., &c., - add to which, the many

onerous secular matters (the thousand-and-one things of daily recurrence, which must be done) and done by one's own self,) of which a person at home in our 'Father's land' can have little just conception – I soon found, that even the delightful pursuit – or rather, [3] recreation – of – Botany, which had grown with years, must now be laid aside. The more-so, too, from my increasing infirmities of severe Rheumatic affection, &c., which sometimes even kept me from my duty. Yet, on finding that my dear friend, D^r. Joseph Hooker, was engaged – and that under the auspices of H.M. Government – in publishing the Flora of these and the neighbouring Islands, I was once more stimulated beyond my strength, and have thus endeavored to send him *scraps* of all I could find in my lonely and often wanderings. – And to this, my Lord, if needed, Sir William Hooker could bear a kind of collateral testimony – namely, the *smallnefs* of the specimens which I have from time to time sent him, gathered in haste and pain, and (often) hunger, and made up when I ought to have been seeking rest in necessary sleep. During the year just past, I have been absent from home travelling among the Natives of this District 205 days, leaving my wife and family with only the wild and uncivilized Natives around them, and that too in these stirring times.

Pardon me, my Lord, if, what I have written should seem to savour of Egotism. For I have only attempted to explain the seeming paradox, why I should not readily do that which my heart so ardently desires.

Should your Lordship, or any other Scientific Nobleman, or Gentleman, send a person to N. Zealand as a Collector of Birds, &c. – and should that person come into my District, or any where within reach of my local influence among the Natives, I scarcely need add, that the same should be fully exercised in his favor. [4]

Perhaps, my Lord, it will not be considered amifs, if I add a few remarks upon the Birds of this Country as there are not, perhaps, many persons who have travelled more in this Island than myself, and, at the same time, paid some little observation to its Natural productions. I believe the

Ornithology of N. Zealand (of the Northern Island at least) to be very poor – comparatively, and to contain but few genera and species in addition to those already known. (The whole number of species, as drawn up by Gray⁹, in Dieffenbach's compilation, only amounting to 84.) The death-like silence of many of the N Zealand forests and plains, strikes the most casual observer; and that too where Birds formerly existed in countless numbers. The Rasorial¹⁰ order was once well-represented, if not in species in number. The *Apteryx*, once every-where common, furnished both food and clothing to the N.Z. chief; cloaks, made of its skins, were commonly worn. The *Coturnix* (*Novæ Zealandiæ*) [New Zealand Quail, *Coturnix novaezealandiæ*] covered the plains, and were often taken in numbers by the Natives with nets. The *Columba* (*argetræa*) [New Zealand Pigeon, *Hemiphaga novaeseelandiæ*] abounded in every wood. And the all but extinct "*Kakapo*" [*Kakapo*, *Strigops habroptilus*] (which I believe will be found to belong to this order) dwelt together in large flocks on the higher ground & amid the umbrageous seclusions of the *Fagus* [*Nothofagus*, Southern Beech] forests. This latter bird, in particular, was preferred by the Natives, for its size, its fleshiness, its gregarious habits, and the ease with which it was captured. From 10 to 14, or more, they say, were generally found together in one "*umu*" (pit); the female bird could not fly, and the [5] male could only flutter a little with his wings, and so manage to ascend the *Fagus* trees the branches of which are low and spreading. I have never seen a *Kakapo*, yet it still exists, but is become very very scarce. My Natives once (when we were travelling across the Ruahine mountain chain) heard one, a cock bird, calling to its mate, and, subsequently, another has been heard in the woods near Taupo Lake. I have offered a great price for one (£4.), and if one could have been obtained, I think I should have had it. I still, however, live in hopes. The *Coturnix*, too, is nearly as scarce. Twice, and only twice, in all my wanderings during 14 years, have I seen this bird - and that in the same locality, the open grounds between Auckland & Kaipara. The *Apteryx* is rather more plentiful, but, also scarce. I saw *one*, a fortnight ago, in the secluded forests of

the Ruahine range, and another answered its call. It ran like a hen when pursuing a flying insect. Unless there should prove to be a great disproportion between the sizes and colours of the male and female birds, there will, I think, be found 2 species of the *Apteryx* [Brown Kiwi, *Apteryx australis*, and Little Spotted Kiwi, *A. owenii*]; one, a smaller bird and of a dirty dingy colour – of this species (or variety) I have only seen *one* specimen, which I (rather unwillingly) spared to the Colonial Treasurer in 1840.

Of *Insessores*¹¹ we have to fear the speedy extinction of the elegant *Neomorpha* (*acutirostris et craftsirostris*), the highly prized “Huia” [Huia, *Heteralocha acutirostris*] of the Natives. And that not only in consequence of the exterminating war carried on against it by the Natives, who generally assemble every spring in order to take them [6] for the sake of their skins and tail feathers, which are greatly valued as hair ornaments, but because it has only been known to inhabit a very limited district. It is now but rarely seen; yet, on one occasion, when travelling along the shores of Palliser Bay, I saw 4, which a Native had just taken upon some *Karaka* (*Corynocarpus laevigata*) trees near by. I had agreed with a Native to snare & take alive some for me, which he did (and which, in fact, has been often by them done), but they soon died in confinement. The Natives invariably speak of this bird, as *being very difficult to keep alive*. It flies but a short distance at a time, and is easily captured. Another large bird of this Order, *Glaucoptis cinerea* [North Island Kokako, *Callaeas cinerea*], the “Kokako” of the Natives, (by some called a “Crow”! and by others placed in the *Corvidæ* Family – with which, surely, it has but little *Natural* affinity,) although at one time pretty generally distributed throughout the Island, bids fair to follow the fate of the others, and soon to become extinct. This bird is now very rarely to be met with. – one of its principal places of resort at present, is, in the dense sequestered woods of Hikurangi, between Wangarei and the Bay of Islands. The two *Cuckoos*, (*Eudynamys* [Long-tailed Cuckoo, *Eudynamys taitensis*] –, & *Cuculus nitens* [Shining Bronze-Cuckoo, *Chalcites lucidus*],) being

migratory, will doubtless, share a better fate. I was not a little and agreeably surprised, when on the silent and snowy heights of Ruahine a few days ago, to hear both these birds. The *Eudynamys*, is almost invariably heard uttering its peculiar cries at intervals throughout the night. The Parrot Family, (represented by the different species of the genera *Nestor*, *Platy* [7] *cercus*, and *Trichoglossus*,) are still abundant in certain woods, particularly the genus *Nestor*, of which there may be two species. Yet these, according to the observation of the older Natives, are as nothing compared with their former numbers. Both *Platycercus NovæZelandiæ* [Red-crowned Parakeet, *Cyanoramphus novaezelandiæ*] and *Trichoglossus aurifrons* [Yellow-crowned Parakeet, *C. auriceps*] are rather scarce in these parts, being much more plentiful at the North, in the woods in the neighbourhood of the Bay of Islands.

The *Grallatorial*¹² order has here several representatives, a few of which are, I think, still unknown to Science. Some of the species of the genus *Charadrius* keep in dense flocks, and haunt the sands of the sea-shore. Others (genera *Hæmatopus*, and *Himantopus*,) lead a more solitary life, being rarely ever seen except in pairs; those of the former genus on the sea-coast; these of the latter on the open and stony banks of secluded rivers. In winter, however, the *Himantopus* [Presumably Black Stilt, *Himantopus novaezelandiæ*] leaves its seclusion, and boldly visits the habitation of man, seeking for worms, &c., in every pool, even at one's very doors. Wilson's description of the flying, cries, tumbling, &c., of the North American species, (*H. nigricollis*, Viell.,) – *vide*, Am. Ornithology, vol. iii p. 76, – agrees exactly with the habits and manners of the New Zealand bird. While others, such as *Botaurus australis* [Australasian Bittern, *Botaurus poiciloptilus*], *Herodias Uatook* [Great Egret, *Ardea alba*], &c., lead a peculiarly solitary life, never being seen even in pairs, and a single one but rarely. The *Herodias Uatook* (*Uatuku* of the New Zealanders), is to be found wading in retired estuaries and bays in the still waters of the sea. I have never heard its cry,

and its flight and movements are so perfectly noiseless, that it might well serve for a personification of living silence. The *Botaurus* (*Uatu ku hu repo* of the Natives), is, on the contrary, a noisy bird; and, like its British relative, generally [8] to be found in secluded marshes, where it makes a loud booming noise throughout the night. A few years back I sent, through Sir W. J. Hooker, a specimen to the Linn. Soc., which I then considered to be another sp. of *Ardea* or *Botaurus*. It was very much smaller than the *B. australis*, to which it is closely allied¹³. The *Porphyrio melanotus* [Purple Swamphen, *Porphyrio porphyrio*], is much more common than any of the three last-mentioned genera. This bird, too, inhabits deep *typha* swamps, where, at intervals during both day and night, it makes a loud noise, hid from observation by the close bulrushes; but in the winter season, when the waters are high, it is driven from its shelter to the neighbouring shores, where from 6 to 10 are sometimes to be seen running about like poultry, their lovely purple necks glistening in the sun. As they are great thieves, being very eager after the Native's Maize and Potatoes, they are often snared and eaten; their flesh is said to be dark and coarse. The *Ocydromus australis* [Weka, *Gallirallus australis*] (*Weka* of the Natives), another solitary bird of this order, is often heard uttering its loud and plaintive cries during the evening and night, in the sequestered mountain forests, and among the sedgy watercourses of the desolate and stony hills. The crop of one, which my dog [*Canis familiaris*] caught on the Ruahine range, was filled with the fruit of Araliaceous plants – probably of *Panax simplex* and *P. arboretum*. Its flesh was coarse and stringy, and skin remarkably thick. An elegant, and, hitherto, unnoticed, species of *Fulica*¹⁴ [New Zealand Dabchick, *Podiceps rufopectus*], (*F. Novæ-Zelandiæ*, vide, Lond. Journ. Botany, vol. iii p. 54,) is casually met with in the deep swamps, and, also, in the reedy sides of rivers. It is, however, a very shy creature. But of all the birds of this order [9] inhabiting New Zealand, which have yet been detected, a species of *Ciconia* (or, perhaps *Grus*?) is, by far, the most interesting. During my residence in these parts, I have, fortunately, seen 5 specimens¹⁵ – 3 of which were in a state

of enlarged captivity: I could not, however, get so near to them as I wished, as they (though tamed) kept in the marshes, or among the reeds on the muddy sides of rivers. The Native Chiefs prize them highly on account of their feathers, which they use to ornament their hair. For this purpose they pluck them twice a year. The bird is, when standing erect, upwards of 3 feet high, bill of a greenish-yellow colour, and much longer than its head, its whole plumage snowy-white; tail feathers rather long soft and drooping; legs of a greenish-grey hue. It is a shy retired bird, and feeds only on small fresh-water fishes. I offered £3. for one, to a poor Native who was in rags, but was refused! I have named it *Ciconia Novæ Zelandiæ* [*Ardea alba*]; and yet hope to be able to secure a specimen. It is not, however, to be found wild in this locality. It is only now and then that one is seen flying. The Natives say it comes from the mountains in the Middle [nowadays called South] Island, which may, perhaps, be correct.

The *Natatorial*¹⁶ order, has, doubtless, several genera in N. Zealand; particularly the Family *Anatidæ*. The *Casarca variegata* [Paradise Duck, *Tadorna variegata*] is a splendid bird, and breeds upon the banks of retired rivers, but is very difficult to rear, invariably escaping, sooner or later, to its loved wilds. The old birds are always to be found in pairs, often in lonely spots on the sea shore. They are not found to the North of this Bay, and are most plentiful in the Middle Island. I have seen from 7 to 9 ducklings with the parent birds at one time. When surprised with their young, the old [10] birds will immediately tumble about in a hundred different ways, to draw your attention from their brood; while the young are seeking to escape in all directions. But, if water is near, they immediately dive into it, and swim a long way beneath the surface, when, rising for a moment, they dive again, and so escape. There are, I think, a few curious members of this Family yet unknown to Science; among which are, the *Wio* [Blue Duck or Whio, *Hymenolaimus malacorhynchus*] (perhaps a species of *Rhynchaspis*), the *Papango* [New Zealand Scaup, *Aythya novaeseelandiæ*], (*Querquedula*? sp., [perhaps Brown Teal, *Anas chlorotis*] and

the *Pakaukuku*¹⁷, small solitary birds, here and there to be met with upon the streams of the mountain recesses far from the haunts of man. I have, also, seen, a graceful species of *Podiceps*? [probably Great Crested Grebe, *Podiceps cristatus*] (not, however, *rufo-pectus*,) a large greyish bird with a fine crest. – A very fine species of *Aptenodytes*¹⁸ (widely different from *A. minor* [Little Penguin, *Eudyptula minor*],) as large as a goose, with crested eyebrows. – And some other small but curious species of *genera novae*, or of genera unknown to me. All of which, however, are rare; and only very seldom to be met with. I doubt not but a few years will suffice to complete the ornithological List of this Island, when the Families Laridæ, Pelecanidæ, and Procellaridæ, will be increased; - the only families, indeed, (with the exception of Anatidæ, and, perhaps, *Muscicapidæ*,) which can, in my opinion, possibly receive any great addition; - especially as we get to know more and more of the Southern¹⁹ most shores of the Groupe.

I have not mentioned the Raptorial²⁰ order, as in that we are practically barren, both of genera and species; professing only those 3 Birds already published, *Falco harpe* [New Zealand Falcon, *Falco novaeseelandiae*], *F. brunnea* [*Falco novaeseelandiae*], and *Athene Novæ Zealandiæ* [Southern Boobook, *Ninox novaeseelandiae*] – unless, as I suspect, there should prove to be another species of *Falco*, or possibly of *Nisus*, or *Milvus*. [11]

I have already, my Lord, spoken of the fast disappearing of nearly all of the genera of the *Rasorial* order from N. Zealand. Such, however, is not confined to that, but is equally applicable in a greater or lesser degree – to every, order – excepting only a portion of the *Natatores*, - i.e. the Sea-birds. Those Families and genera which have a greater capacity for escaping from their many foes suffer least, and *vice versa*. Their foes are, Man, Dogs, Pigs [*Sus scrofa*], Cats [*Felis catus*], Rats [presumably Brown Rat *Rattus norvegicus* and Black Rat *R. rattus*], Hawks, and Owls; and last, though not least, the frequent and extensive fires of the Natives every spring Season; through which leagues of forest, plain, and

marsh, vegetation is annually consumed. The wild Pigs, Cats, Dogs, & Rats, (all introduced) devour the eggs and young brood in countless numbers every year. The natural prey of the Hawks & Owls, of this Country, is small birds. And Man (the Native, man, woman, and child,) kills always and never spares all that comes within his reach, whether for food, for ornament, or for their sport. Hence it is that the *Rasorial* birds, in particular, are all but extinct. Wherever I have gone – whether the uninhabited Islets off the shore, the unfrequented mountain's brow, the depths of the primæval forest, or the secluded morass – I have everywhere found numberless traces of those foreign pests, Rats & Cats. Nor is the mischief confined to the Class *Aves*. Of the 3 terrestrial mammals which N. Zealand possessed, two have, I fear, been entirely lost. – the Dog [Kuri, *Canis familiaris*], and the Rat [Kiore, *Rattus exulans*,] (? *Arvicola*, sp.). The Dog has been so blended and crossed with all kinds and varieties as no longer to be discriminated. – In fact, it is to be doubted, whether the Native Dog was ever truly indigenous, as I believe it was never, at any time, to be met with wild. The Rat, however, was truly indigenous, [12] and existed in countless thousands, in every grassy plain and sedgy hill, dwelling peaceably with the *Coturnix* and *Apteryx*. Now, however, not one is to be obtained, although I have often offered large rewards for one. The third mammal, the Bat (perhaps 2, or more, species [New Zealand Long-tailed Bat *Chalinolobus tuberculatus* and Lesser Short-tailed Bat *Mystacina tuberculata*],) still exists, owing to its fortunately having wings, but is, also, become very Scarce. The orders *Reptilia*, and *Mollusca*, have also suffered greatly: Animals of the former order, of the *Saurian* Family, literally swarmed throughout the Island; but now many of the larger genera are all but extinct, through the continual inroads of their adversaries – Pigs & Cats. And of the *Mollusca* – particularly the Families *Pulmoneæ*, *Cardiaceæ*, and *Inclusæ*, - several genera are become exceedingly Scarce. For, not only have the Land and Fresh-water species been diligently and constantly consumed, but daily and nightly upon the ebbing of every tide, droves of pigs frequent the sandy shores in search of

their wonted supply. I have often been astonished at the sagacity displayed by this mammal, as well as at the strength of its jaws in crushing with ease the thickest shells, apparently quite free from pain or inconvenience in its tongue and mouth, although continually filled with sharp fragments and laminæ of broken shell. – So, again, in the Vegetable Kingdom; several Orchideous and other plants having edible roots, and which formerly grew so very plentifully as to afford food for man, are now all but entirely lost – their roots having been eagerly sought after by the innumerable herds of wild pigs which infest the whole extent of the Country; while other smaller plants, which grew upon the surface of the soil, have also, if not quite disappeared, become exceedingly scarce, through the continual uprooting of their foes, [13] and the equally fatal fires of the Natives.

Before, however, I conclude, I should, perhaps, mention some of the very great difficulties now attendant upon the procuring of a living specimen of any of the larger and more valued Birds. – For, my Lord, in addition to their extreme scarcity, and to the few which remain having retreated before their foes to the more inaccessible parts of the mountain forests, (where food for the Collector is not to be found,) is the very great disinclination of the older Natives – who alone know their haunts, their food, their calls which they imitate, and the manner of snaring them – to go forth upon such an errand – even when tempted with gold! It is not the apparent fruitlessness of the search, nor is it the smallness of the reward in their estimation, which keeps him inactive; but it is that peculiar apathetic state of mind – unknown to Englishmen, though common, I believe, to all Savage Nations – which knowing no present want, cannot, by any means short of despotic, be goaded to ejection. An old N. Zealander's²¹ wants are very few, and soon supplied, and then he sleeps in the Sun. A Young N. Zealander's wants are more – much more – but his disinclination to labour, and actual disability to those works in which his Forefathers excelled, is far greater than that of the older ones. So that, an *old* Native will not go because he has no present want to send him forth; and a *young*

Native will not go, because he does not know *how* to go about it. Nor should the present (and, I greatly fear, prospective,) unsettled state of the country, be altogether lost sight of; as, I much doubt the safety of anyone who should now happen to be [14] wandering about among the Tribes as a Collector.

I have intimated, my Lord, the great difficulty which I have experienced in attempting to keep some of the N. Zealand birds – especially the genera *Philedon*, *Anthornis*, *Rhipidura*, *Miro*, *Platycercus*, *Columba*, *Botaurus*, &c., - which, doubtless, in great measure was owing to my ignorance of their natural food, or inability to supply it when known. The genera, *Philedon*, *Anthornis*, and *Platycercus*, are, however, very subject to fits when in a state of confinement, which soon carry them off. And I have, also, been informed by the Natives, (who anciently delighted in taming all they could, taking no small pains therein,) that they could only succeed with a very few, - such as *Nestor*, *Larus*, *?Ciconia*, *Philedon*, and (rarely) *Apteryx*. And, if I recollect aright, H.M.S. “Buffalo,” when here loading with spars, in 1834, took away a very great number of living Birds, especially of the genera *Philedon*, and *Platycercus*, not one of which, (if my information is correct,) reached England alive – save *one* (*Philedon Cincinnatus*, Cuv., [Bellbird, *Anthornis melanura*]) which happened to belong to one of the forecastle-men!

And now, my Lord, in conclusion, allow me to say:- If I should be at any time so fortunate as to procure a *living* specimen of “*Kakapo*,” *Apteryx*, *Coturnix*, or *?Ciconia*, or of any rare or curious birds, I will do my best to preserve and send it alive to your Lordship. And, should you wish to have the skins (roughly dried) of any species, I will strain every nerve to procure and send them to you. And, should I have a little more leisure by-and-bye, or should I be removed to a Station nearer woods and nearer to a Harbour – and health be graciously vouchsafed – I will then most cheerfully do my utmost to send to your [15] Lordship a case of living plants. The Country round about one here, for many miles, being particularly barren in Trees, Shrubs, and Curious Plants.

I trust your Lordship will graciously pardon this long and tedious, and (perhaps) uninteresting Letter – which I have written by Snatches – and permit me to subscribe myself,

Your Lordship's
most obedient and Hble. Servt.,
William Colenso.

The Rt. Hon. The
Earl of Derby,
Knowsley."

COMMENTARY ON THE LETTER SPECIES DECLINES

In his letter, Colenso mentions 29 bird species that can be identified. For nine of these species, he notes decreased abundance, some of which appears to be based on personal experience between 1834 and 1848:

"The death-like silence of many ... forests and plains"

"where Birds formerly existed in countless numbers"

"The Rasorial order was once well-represented, if not in species in number"

"The Apteryx, once every-where common"

Quail once "covered the plains"

Pigeons once "abounded in every wood"

Kakapo have "become very very scarce" and are "all but extinct"

Quail are "nearly as scarce" as Kakapo, and were seen "only twice" in his travels in 14 years

Kiwi are "also scarce"

"we have to fear the speedy extinction" of the Huia

Kokako: "although at one time pretty generally distributed throughout the [North] Island, bids fair to follow the fate of the

others, and soon to become extinct. This bird is now very rarely to be met with.”

Abundance of parrots is “as nothing compared with their former numbers”

“the fast disappearing of nearly all of the genera of the *Rasorial* order ... Such, however, is not confined to that, but is equally applicable to a greater or lesser degree – to every, order – excepting only a portion of the *Natatores*, i.e. the Sea-birds”

“the *Rasorial* birds, in particular, are all but extinct”

“the larger and more valued” birds: – These now occur in “extreme scarcity”; “the few which remain having retracted before their foes to the more inaccessible parts of the mountain forests”

CAUSES OF DECLINES

Colenso’s letter is evidently uninfluenced by any books, apart from the list of species catalogued by Gray (1843). His remarks on declining species appear to be based on eyewitness observations and discussions with Maori people, some of whom remembered the visits by James Cook (J. D. H. 1904). Colenso discusses three factors relevant to species declines. These are listed below in chronological sequence.

Hunting by humans (Maori). Kiwi were hunted for food and clothing for chiefs; cloaks were “commonly worn.” Quail were “often taken in numbers ... with nets.” Kakapo were eaten (its “fleshinefs” is noted). Huia were “highly prized” for their skins and tail feathers, which “are greatly valued” as hair ornaments. Pukeko were regarded as a pest of gardens of Maori, and were “often snared and eaten.” The egret was prized by Maori chiefs for its white feathers, which were used to ornament the hair.

Introduced mammal species and predatory native bird species. European dogs, pigs, cats, and rats are mentioned. Rats and feral cats were found in “numberless traces” everywhere Colenso had travelled. Colenso also noted the extent of

predation by hawks and owls. The Kiore (*Rattus exulans*) was thought by Colenso to have declined to extinction, and a bat had become very scarce. Declines of reptiles, molluscs, and plants with edible roots were attributed to feral pigs.

Frequent and extensive fires set by Maori in spring.

GENERAL DISCUSSION

The breeding landbird fauna of North Island in the early nineteenth century was 32 species. More than half of these species had been named scientifically in the 1780s following the collection of specimens at the various anchorages used at South Island by the expeditions led by James Cook. The few remaining species that were unknown to science received Latin binomials in the 1840s. Colenso's letter of 1848 provides a link with the earliest lists of bird species published for North Island (Yate 1835, Polack 1838, Gray 1843, Gray 1844-1845). In the first two lists birds were identified only by Maori name, whereas the last two lists also included the then current Latin binomial.

The bird lists provided by Yate (1835) and Polack (1838) do not include the New Zealand Quail, which seems a significant omission because it is one of the few native game landbirds that English people would have related to. It appears that this species had become very rare before the early 1830s, as implied by Colenso's letter.

William Colenso was aware of the process of extinction, as he referred to the example of the Dodo (*Raphus cucullatus*), which had become extinct on Mauritius (Colenso 1843:99). The source of his understanding of extinction may have derived from Lyell (1830:148-156), one of the first widely read accounts of this process. Early in the 1840s Colenso became aware of the bones of Moa and wrote a well-reasoned paper on them (Colenso 1843). In early 1842 he remarked upon the replacement of native plant species by "noxious European weeds" (Colenso 1844:51).

Colenso's comments on causes of species declines are significant because the nominated factors precede the operation of many other factors discussed by later writers. By 1850 destruction of the native vegetation for European farming in the North Island was still limited (as mapped in Mills and Williams 1978), as the Treaty of Waitangi

(facilitating large scale sale of Maori lands to settlers) was not signed until 1840. The only bird species that had been introduced was the Common Pheasant (*Phasianus colchicus*). Rabbits (*Oryctolagus cuniculus*) were liberated from 1838 (King 1984). Australian and British passerine birds, and British predatory mammals such as stoats, weasels, and ferrets, had not yet been introduced (Long 1981, King 1990). The task of trying to determine the causal factors involved in declines is thus greatly simplified.

The declines observed by Colenso on North Island seemed to continue. When the prominent collector E. L. Layard visited for 11 months in 1861–1862, he found “a singular dearth” of bird life in forests, indicated by few species seen and low abundances (Layard 1863). By the 1880s many bird species had become “extremely rare” (Reischek 1885).

Chronological survey of reports of natural history.—The three broad classes of threatening processes identified by Colenso were also recognized by many of his contemporaries. Because Colenso attributed species declines to both direct and indirect human activities, it is useful to examine in chronological sequence when human interventions in the North Island landscape occurred. Polynesians colonized in ca.1000–1200 AD (Anderson and McGlone 1992) and Europeans (sealers and whalers) first visited in 1791 (King 1984), after Australia was settled by the British in 1788. The Bay of Islands was not much frequented until ca. 1804 or 1809, when a few American whalers visited (Straubel 1954, Kenny 1956). This bay subsequently proved to be a popular resort, as it offered safe anchorage, supplies of wood and freshwater, and opportunities to trade with the local Maori for meat (pigs). The first account comes from Samuel Marsden, who established a mission in 1814 (Nicholas 1817, Elder 1932). The brig *Active* departed from Sydney, New South Wales in November 1814 with cattle (*Bos taurus*), sheep (*Ovis aries*), horses (*Equus caballus*), pigs, goats (*Capra hircus*), cats, dogs, and “an immense quantity of poultry” (Nicholas 1817 vol. 1:38). The Maori had evidently not seen cattle or horses before (Nicholas 1817 vol. 1:84, 171). A previous visit by missionaries had acquainted Maori with chickens (Nicholas 1817 vol. 1:210), and fowls were given to Maori by Marsden. The only mammals mentioned present in the region visited are pigs and dogs in a Maori village (Nicholas 1817 vol. 2:107, Elder 1932:97) and cats with a party

of Maori (Nicholas 1817 vol. 2:22). The dogs probably refer to the Kuri, a native dog, whereas the pigs were probably descended from some donated to Maori people in 1793 by the Governor of New South Wales. The only "vermin" alluded to on this visit was body lice (Nicholas 1817 vol. 1:282, vol. 2:41, 43), and it seems that no Kiore or other rats were seen (Nicholas 1817 vol. 2:125).

Marsden made six other visits in the period 1819-1837, and first mentions a domestic cat in the possession of Maori (roasted and eaten) in 1820 (Elder 1932:284). During this visit Marsden reported seeing very fat pigs, fowls, and a dog (as skins worn by Maori). Cruise (1824) confirms these records, but also recorded rats "so much smaller than the European rat" [?Kiore], and also observed extensive burning of vegetation by Maori in October 1820, for the purpose of preparing land for cultivation. In addition, quail were seen on Motorua Island in 1814. The kiwi cloak is noted as "the most costly dress a chief can wear" (p. 316).

The next account, by R. P. Lesson in 1824 during Louis Duperrey's voyage, mentions the pig, New Zealand Dog, and a native rat, all eaten by Maori (Sharp 1971). Also recorded are Maori hunting kiwi with dogs and making cloaks with kiwi feathers. Quail were reported, as "delicate game."

In February 1827 Dumont d'Urville (who had previously visited on Duperrey's voyage) commented on smoke from many fires near Hawke Bay (Wright nd:113, 115). He also noted a cloak trimmed with kiwi feathers, "one of the most important articles of luxury" among the Maori, who hunted kiwi at night with torches and dogs (p. 122). Quail were recorded (p. 153). The presence of a species of rat was reported on South Island but not on North Island (p. 78), perhaps indicating their scarcity on North Island.

A few months later, the artist Augustus Earle arrived and lived and travelled widely for seven months in the northern part of North Island (Earle 1832). He found pigs and dogs to be feral, stealing food from Maori villages, and thus necessitating food to be hung in baskets on poles out of reach of these animals (pp. 21, 22, 195). Dogs were depredating poultry, pigs, and goats (pp. 147-148) and also ate human corpses (p. 82). These dogs were introduced by Europeans, and had increased rapidly in numbers (p. 147); evidently in this part of New Zealand they had already replaced the Kuri. Although Earle alluded to "vermin" (principally fleas, pp. 35, 98, 232, 261), his account includes

no reference to cats (domestic or feral) or rats. This may signify their scarcity.

William Yate lived on North Island for much of the period 1828–34 (Yate 1835). The only bird species noted as rare (or perhaps just difficult to capture) is the kiwi. He had seen only one garment made of kiwi skins during his 6½ years of residence, and the Maori who possessed it would not sell it (Yate 1835:59). Yate seems to be the first European to note the value of Huia tail feathers to Maori (p. 61) and record its flesh as “delicious” (p. 62). Kiore and platforms to secure plant food from rats were recorded in passing, apparently implying that Yate had no personal experience of rats (pp. 70, 155).

J. S. Polack, a well-travelled trader, lived in North Island in the period 1831–1837. It appears that vol. 1 of his account refers to the period 1831–1836 and vol. 2 relates solely to 1837 (Polack 1838). He recorded the ornamental value of the tail feathers of the Huia in the hair of the head of Maori (Polack 1838 vol. 1:112, 158, 301). He stated that many bird species “are disappearing” and attributed this to “a difficulty” in the “volitary powers, caused from the sparseness of their wings, whereby they become of easy prey to the natives” (Polack 1838 vol. 1:307). Perhaps this comment refers to the kiwi, as the method of hunting used by Maori is described (Polack 1838 vol. 1:302) and he states that the Maori cloak made of kiwi feathers is a rarity and unobtainable by a European (pp. 228, 393). He also noted the presence of Kiore, their consumption by Maori, and the use of platforms on trees to protect tubers from dogs and rats (Polack 1838 vol. 1:65, 314; vol. 2:33, 377, 381; Polack 1840 vol. 1:214–215). Polack does not mention any nuisance caused to him by rats, in contrast to frequent allusions to fleas and lice (Polack 1838 vol. 1:69, 123, 185, 233, 320). He states that the Cat was introduced within the last 25 years and is highly regarded by Maori for its flesh and its skin (Polack 1838 vol. 1:314, vol. 2:60).

The next visitor who left a relevant account, Charles Darwin (Bay of Islands, December 1835), noted that “It is moreover said that the introduction of the common Norway rat [*Rattus norvegicus*] has entirely annihilated the New Zealand species in the short space of two years, from the Northern extremity of the [North] island” (Darwin in Keynes 1988). It appears very likely that the source of this statement was Colenso.

The botanist Allan Cunningham visited North Island in 1838, and reported that Maori had extirpated the kiwi in some districts where it had once abounded. He described their mode of hunting them, and outlined the value of kiwi meat and feathers to Maori people (Cunningham 1839).

The botanist J. C. Bidwill twice visited North Island during the period 1839-40. Although he remarks on the abundance of several bird species, and includes an account of how Maori caught and tamed Kaka (*Nestor meridionalis*), he makes no reference to vermin apart from fleas (Bidwill 1841).

In 1840 Jamieson (1842:251) observed on the North Island that Maori stored their wheat placed on posts encircled by pieces of wood inclined downwards, "a contrivance which prevents the depredations of rats." In addition, he observed on many trees small stages on which tubers were deposited "beyond the reach of these voracious animals." Jamieson noted that mice and rats "now over-spread the land" (p. 335).

Ensign Best visited the North Island during 1837-43 and his journal is most informative about the methods used by Maori to take birds, principally Kaka and pigeons. (Taylor 1966). Cats were kept as pets "but tied up like dogs on account of their thieving propensities" (p. 345). Kakapo were described as "having formerly been plentiful in the woods near Tauronga & Rotoru" (22 January 1843). As to kiwi, Best thought himself "so lucky as to get from a native a specimen ... a bird almost unknown to Ornithologists." It is of interest that Best recorded rats aboard ship on the voyage from England in 1837 (p. 109).

Ernest Dieffenbach, who was appointed naturalist to the New Zealand Company, made several journeys in New Zealand in the period 1839-41. His account (Dieffenbach 1843)²² mentions: feral cats, dogs, and pigs (vol. 1, pp. xx, 416), destruction of kiwi, attributed to dogs and cats (p. 230); rats running over us at night (p. 145); birds "everywhere scarce" (p. 147); Weka as having become "very scarce, on account of its being destroyed by the wild dogs and cats" (p. 312); and generally attributes the decreased abundance of birds to the dog and cat which dispersed into the forest following the "breaking up of the tribes" (p. 86). The head of a Maori ornamented with tail feathers of the Huia is noted (vol. 2, p. 54). The Kiore had become "so scarce, owing to the extermination carried on against it by the European rat" (vol. 1:396).

Wakefield (1845) spent the period 1839-1844 in New Zealand. He noted that the headdress of one Maori chief contained 98 Huia feathers

(vol. 1:97) and that Maori captured young Kaka (vol. 1:259).

When the US Exploring Expedition visited the Bay of Islands in 1840, it was noted that root vegetables were stored by Maori in specially constructed houses to prevent the depredations of rats (Wilkes 1844 vol. 2:389).

Rats and mice were so common by 1841 that Maori now used the fibre of tree ferns instead of wood to construct their houses and stores. These rodents could not gnaw through these fibres as easily as they could through wood (Colenso 1844:37).

In January 1842 Colenso noted damage caused by European rats to Maori Kumara plantations in Rotorua district (Bagnall and Petersen 1948:124). These rats had infested the district in large numbers. At night old Maori men every few minutes pulled on flax lines to which mussel shells were attached. The resultant noise scared the rats away and minimized damage to the crop. Colenso noted that the Kiore did not damage the crop.

In early February 1842, nine weeks into a three month's excursion, Colenso first noted New Zealand Quail (*C. novaeseelandiae*) "among the fern brakes" near Manukau Bay (Taylor 1959:45). His Maori guides informed him that quail had once been "very common" in North Island, but were now "somewhat scarce, owing, no doubt, to the increasing number of its introduced foes—dogs, cats, and rats. The natives used to take this bird with nets ... It is a shy bird, being but seldom seen; their cry, however, is often heard"

J. B. Williams in 1842-1844 refers to "vermin and rats" at the Bay of Islands (Kenny 1956:100). Cats were popular with Maori because they kept the rats down, "for they are overrun with them; they are so bold and fearless as to eat their toes, feet, and sometimes their body" (p. 80). Williams also commented that "Foreigners are quite as much annoyed by the rats, [in] many instances these little brutes (by the way not small either) have literally torn their feet to pieces, and have been known to eat of other parts of their body. These little Cannibals are very bold and annoying." Williams could not determine whether these rats were indigenous or introduced (p. 111). Although Williams included an annotated list of birds, he does not discuss their status other than to indicate that the hawk [Swamp Harrier, *Circus approximans*] and sparrowhawk [New Zealand Falcon *Falco novaeseelandiae*] are pests of poultry.

Colenso (1843) noted that the Kuri was eaten by Maori and its fur was used to make a garment. This dog had become "very scarce, in consequence of the continued introduction of other and larger varieties." (p. 97). The Kiore was evidently scarce, as it was "now seldom met with ... Its place ... is more than supplied with the common species of [Ship Rat *Rattus rattus*, Brown Rat *R. norvegicus* and House Mouse *Mus musculus*] which every where abound to the infinite annoyance of the natives." Kiore were eaten by Maori especially when fat. Pigs, dogs, cats, rats, and mice are "now both wild and numerous throughout" North Island. "Even the dense forests of the interior, far away from the residence of man, are infested with the smaller vermin. The natives attribute the destruction and all but extinction of the *Kiwi* ... , the *Koitareke*²³ (a species of *Tetrao*), the *Weka*, the *Kiore maori* [*Rattus exulans*], and the other terrestrial animals, to the voracity and numbers of these foreign pests." (pp. 98–99).

Cats were frequently met with among the Maori in North Island in 1844 (Angas 1847).

In February 1844 Colenso observed a brace of New Zealand Quail near Kaipara and noted that this species was becoming increasingly rare (Bagnall and Petersen 1948:176).

The most complete picture of the New Zealand avifauna before 1850 was provided by Gray (1844-1845), based on the visit of HMS *Erebus* and HMS *Terror* in 1841. Although this mentions the source of specimens and the collector, notes on status are provided for only two species. No quail were seen on North Island, implying that the species was scarce or even extinct. The Huia is noted, quoting one of Gould's collectors, as "apparently becoming extinct, and will probably soon be exterminated," with hunting by Maori for its tail feathers being implicated, compounded by its small geographical range on North Island.

On 14 December 1848, near Te Awarua, Colenso's dog started "two English rats, one of which it killed." In his journal, Colenso wrote: "a sad proof of the extent to which the whole country is now over-run with them, hence the total destruction of the numerous Gallin. birds with which the grassy plains and fern brakes of this country once abounded, and the present death-like silence of the forests" (Bagnall and Petersen 1948:288).

In fact, Colenso first saw a Kiore in 1850. He described it as not unlike but smaller than "the English rat" (letter to R. Gunn, 4

September 1850, cited by Bagnall and Petersen 1948:292). Colenso dispatched two specimens of Kiore to J. Hooker (letter, 4 September 1850) and wrote: "During my long residence in N.Z. and constant endeavour to obtain a sight of one of these rats, I have never till now succeeded."

Churton (1853) confirms the extinction of the Kiore on North Island, and notes that they were last seen at Wanganui in ca. 1841. He attributed their demise to feral cats and introduced rats.

It is likely that additional accounts of visits to North Island up to 1850 exist, either as published books or as unpublished documents (letters, diaries, journals, manuscripts) held in government archives in New Zealand. It would be worthwhile searching for these and extracting relevant ecological information. Reports of visits by non-English speaking Europeans may also prove useful, for example, the journal of the German botanist Karl von Hügel's visit to the Bay of Islands in March 1834 remains untranslated (Clark 1994).

Did avian diseases cause declines before introduced rats established?—It seems clear from the foregoing eyewitness accounts that introduced rats were displacing the Kiore during the period 1830–1835. Cats did not become feral until after this period, and may have benefitted from the plagues of rats. The identity of the introduced rats is not known for certain, as specimens seem not to have been preserved (Grey 1843). Atkinson (1973a) argued that *R. norvegicus* was the first rat species to have established, with *R. rattus* arriving later. However, Colenso (1843) mentions both species as present in the North Island. This point is important in dating times of decline and extinction of native bird species, because *R. rattus* is more arboreal than *R. norvegicus* and potentially can cause more declines.

A widespread presumption and perennial theme is that declines of native bird populations were mediated via predation by introduced rats. This is expressly stated by Colenso (1843) and implied in his letter of 1848. Predation as the main or a significant factor (involving humans, rats, dogs and cats) is also stated or implied in later accounts for the North Island (Churton 1853, Hooker 1864b; Buller 1868, 1874, 1877; Hutton 1870, 1873; Kirk 1895, Pycroft 1898), and for the South Island (Haast 1862, 1864; Buller 1868; Potts 1869, 1870; Gillies 1877; Buller 1891, 1892; Reischek 1930).

But how likely is it that rats overran an area as large as 11.5 M ha (North Island) in such a short time? Another major difficulty is that not all bird species showed early declines, including the Australasian Pipit (*Anthus australis*, a ground nesting species), Hihi (*Notiomystis cincta*), Bellbird, Tui (*Prothemadera novaeseelandiae*), Saddleback (*Philesturnus carunculatus*), and Piopio (*Turnagra capensis*). None of these species is commented on in Colenso's letter. Indeed, some of these species were still locally abundant in 1867 (Hutton 1867). Useful tabulations of body size (Holdaway 1999) and of habitat type and nesting site (Roff and Roff 2003) indicate that not all declining bird species nested or lived on the ground, were large, or were flightless.

An alternative perspective is that introduced disease or diseases impacted first on the native fauna. Those species with little or no innate resistance declined rapidly, and those with partial or complete resistance declined moderately or not at all. This view has generally been overlooked (Oliver 1955:37-39, Williams 1962, Atkinson 1973a), presumably because direct evidence is lacking. Disease as a relevant factor was at first not considered by Holdaway (1989), but was later discounted (Holdaway 1999) because of phylogenetic diversity of the taxa affected and phylogenetic closeness of the taxa that persisted. Worthy and Holdaway (2002:534, 557) dismissed disease(s) as a satisfactory explanation of declines and extinctions because "[t]oo many coincidences are required" and there are "too many inconsistencies in the evidence," even though disease could explain "puzzling gaps" in patterns of decline (p. 555). Others have regarded a disease hypothesis as plausible but speculative, but usually linked to introduced birds (Oliver 1955:511, Phillipps 1963:60-61, Greenway 1967:200, 431, King 1984:80-81; HANZAB 1993 vol. 2:402, 505; HANZAB 2001 vol. 5:956; HANZAB 2006 7A:958, 1014). Atkinson (1973b) conceded that diseases, "perhaps introduced with European birds, are often thought responsible for the decline of some native birds. The introduced Blackbird (*Turdus merula*), Chaffinch (*Fringilla coelebs*), and to a less extent, Song Thrush (*Turdus philomelos*) have penetrated to remote parts of the forest." Nonetheless, he thought that predation was more likely to have been the main cause of declines, and this has been the orthodox view ever since.

Williams (1976) took an ambivalent stance in explaining the decline of callaeatid bird species, attributing this to "a complex combination of some or all of these factors [competition with alien

species, human exploitation, habitat destruction, disease] with others less easily definable.” Because species persisted on islands with introduced bird species, he regarded the hypothesis of disease as “impossible” to accept. He also acknowledged some “awkward” exceptions to the hypothesis involving predation by ship rats.

The logic behind the disease hypothesis is as follows. Visits to the Bay of Islands by whaling ships increased dramatically in the 1830s, for example 42 ships in 1833 (Straubel 1954) and 151 vessels in 1836 (Polack 1838 vol. 1:252). During the 1830s, upwards of 27-30 vessels had been seen at anchor in the Bay of Islands at the same time; these were from the ports of Great Britain, America, France, Sydney, Hobart, and Adelaide (Yate 1835:27, Polack 1838 vol. 1:251). Indeed, Polack stated that 3,000 to 4,000 ships had anchored at this locality in the period 1772-1837 because of its excellent harbour (pp. 33, 49). By 1837 some 500 Europeans lived there permanently, with another 100-300 present as a floating population (Straubel 1954). Each ship increased the opportunity for both diseases and foreign rats to be introduced. These diseases, if novel to New Zealand, should have spread to the indigenous fauna and affected species according to their genetic resistance, increasing mortality and decreasing fecundity (McCallum and Dobson 1995). Once in the affected bird population, disease would spread rapidly throughout the population through contagion, or infection by vectors such as biting insects, and diffuse rapidly (given the short generation times of bacteria, viruses etc.) to adjacent populations of birds. Many early accounts refer to mosquitoes as present (sometimes in great abundance) in North Island (Nicholas 1817 vol. 2:257, Earle 1832:35, Yate 1835:72, Polack 1838 vol. 1:319). After the disease wave had passed through, predation by rats subsequently became a significant factor, as populations of rats built up and became more or less permanent. This, and other factors, combined to produce an ongoing ecological crisis.

Evidence for disease is, however, limited. This is because settlement of North Island took place well before the germ theory of Pasteur was developed, no pathologist was present, and the interest of a pioneer society was in securing the livelihood of the settlers, not in investigating the status of the indigenous fauna. Moreover, it is unusual for dying animals to be observed, and any corpses would soon be eaten by scavengers, thus accounting for the lack of any contemporary evidence to corroborate the presence of avian disease(s). In addition,

the source and vector of any disease(s) cannot be conclusively established: Poultry and mosquitoes would seem the most likely candidates. It is implausible that introduced rats were responsible for the spread of avian disease(s).

Analogy also provides some support for the early role of disease in diminishing populations of native fauna in New Zealand. Soon after Christmas Island (Indian Ocean) was first visited by Europeans, *Rattus rattus* was accidentally introduced and trypanosomes quickly eliminated one (and possibly both) endemic species of native rat but not the native shrew or any of the native bird species (Pickering and Norris 1996, Johnstone and Storr 2004, Wyatt et al. 2008). During the period from 1880-1920, an epizootic spread through a large part of Western Australia and caused remarkable contractions in geographical range of many marsupial and rodent species, and possibly several bird species (Abbott 2006, 2008). Declines in the endemic avifauna of the Hawaiian Islands have been linked to the introduction of exotic mosquito borne disease (Warner 1968, Van Riper et al. 2002). In Britain the replacement of the native Red squirrel by the introduced Grey squirrel has been linked to a virus (Tompkins et al. 2003). The recent prevalence of protozoa in some New Zealand bird species has also been attributed to the establishment of an exotic species of mosquito (Tompkins and Gleeson 2006, Derraik et al. 2008).

Another presumption is that the persistence and abundance of some bird species on satellite islands around North Island, compared to North Island itself (Hutton 1868; Buller 1877, 1891, 1898) is solely because of reduced predation. It is important to recognize that islands can also act as safe havens from disease.

There is no reason to doubt the observations made in the 1830s and 1840s. However, the inferences made about predation by rats and cats represent opinions, not facts. It is necessary to look behind the immediately obvious, not confuse correlation with cause, and recognize that extinction is a multiphasic process, with many factors in play. Most of these factors have a minor contributory role, and only one or two factors have a major part in the process. Disease remains an ongoing, contemporary (but under-estimated) process in the New Zealand avifauna (Tompkins and Jakob-Hoff 2011).

Disease can explain declines of bird species that have long interested ornithologists in New Zealand and elsewhere. For example, Greenway (1967:420) mentioned “probably an unknown factor of

disturbance” playing a part in the decline of *Notiomystis cincta*. Williams (1973) wrote of many bird species indigenous to New Zealand having shown “a sometimes unexplained sensitivity to subtle changes in a still-extant indigenous environment.” The decline of five landbird species on Lord Howe Island within two years of the arrival of rats in 1918 (McCulloch 1921) and their extinction within 10 years (Hindwood 1940) is usually assumed to have resulted from predation (McCulloch 1921, Hindwood 1940). However, three other passerine species have persisted, and this may instead indicate immunity to a disease introduced by the same shipwreck. When Norfolk Island was occupied by the British in 1788, rats were found to be abundant and destructive to barley and wheat crops (Fidlon and Ryan 1980), and a rat nest was discovered in a flour cask that came from a ship (p. 111). Rats were “very numerous” in 1835 (Backhouse 1843). Yet most of the landbird fauna persisted a century or more in the face of rat predation (HANZAB 1990-2006), and those that disappeared early were larger species (pigeons, parrot, hawk, quail) shot for food or sport. Presumably diseases detrimental to the avifauna were not introduced to Norfolk Island.

In the past 20 years there has been increasing recognition of the importance of infectious diseases in the dynamics of animal populations (McCallum and Dobson 1995), particularly to island avifaunas (Wikelski et al. 2004). The introduction of disease to islands has been related to the importation of domestic chickens (Wikelski et al. 2004, Gottdenker et al. 2005). New techniques (molecular markers) have the potential to resolve the identity of these diseases and the evolution of resistance to these diseases, based on analysis of blood samples from extant populations or from museum skins of species that became extinct or declined before recovering (Beadell et al. 2006, Foster et al. 2007).

More attention needs to be given to identifying and explaining the successive waves of extinction in New Zealand, ascertaining the correct historical sequence of relevant natural and anthropogenic factors, and appraising the timing of declines by comparing the three main islands as separate ecological settings. Worthy and Holdaway (2002) have provided a very promising start, and this needs to be built upon. While the evidence for the role of disease(s) is at present circumstantial and not definitive, the application of molecular techniques to material preserved in museums could contribute to the testing and refinement of this hypothesis. Government archives, diaries of early explorers, letters

of early settlers and travellers, and early issues of newspapers need to be searched for any accounts of diseased birds, unusual behaviour of birds, or sudden local disappearance of species. Until assessment of these sources is completed, it is premature to disregard avian disease as relevant to understanding declines and extinctions of bird species in early nineteenth century New Zealand. Absence of evidence in favour of disease impacts does not necessarily signify evidence of the absence of avian diseases.

CONCLUDING REMARKS

Colenso's letter of 1848 provides an important bridge between the few comments on declines of bird species recorded in Dieffenbach (1843) and the numerous remarks chronicled from the 1860s by many observers. The generally accepted interpretation, that these early declines resulted principally or solely from predation on individual birds and their eggs, is questioned in this paper. Instead, the hypothesis is proposed that disease was responsible for some of the early declines of several bird species. Those species that persisted until other factors came into play are hypothesized to have possessed immunity to this disease. Introduction of an epizootic is potentially the second transformative event in New Zealand ecology, following the extirpation of all moa species from predation by Maori. It is, however, important not to overstate the role of epizootic disease. Its influence probably waned after 1840 as introduced rats spread across North Island.

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END NOTES

- ¹ Colenso subsequently sent two specimens of New Zealand Dabchick (*Podiceps rufopectus*) and one specimen of Sacred Kingfisher (*Todiramphus sanctus*) to Lord Derby; these were received on 2 July 1849. They are now deposited in the Liverpool Museum (C. Fisher, pers. comm.). Bagnall and Petersen (1948:280) noted that Colenso had sent four bird skins to Lord Derby before 29 September 1848. The fourth skin was of Great Egret (*Ardea alba*).

- ² Colenso's biographers (Bagnall and Petersen 1948:270) do, however, allude to this letter but evidently no copy was found by them in the manuscripts examined. Colenso wrote a letter in 1848 to Sir William Hooker (date not disclosed by Bagnall and Petersen 1948) in which he speculated whether he may have offended Lord Derby by declining to collect bird specimens for him. Colenso refers to "the all but extinction of many of the more prized genera and species of the class *Aves*."
- ³ The basis of his election, successful on its first proposal, is quoted by Bagnall and Petersen (1948:427-428) from the minutes of the Royal Society, dated 6 May 1886.
- ⁴ i.e., 95% of species were rejected. Compare this degree of splitting with 94% for the 33 New Zealand bird species described by Colenso's near contemporary, W. Buller (1838-1906), FLS, FRS (Galbreath 1989).
- ⁵ Colenso was aged 36 years.
- ⁶ Colenso had returned from travelling on 14 January 1848 (Bagnall and Petersen 1948).
- ⁷ Perhaps a reference to Laughing Owl (*Sceloglaux albifacies*).
- ⁸ Not *Dacelo*, which comprises the two species of kookaburra of Australia.
- ⁹ Gray 1843.
- ¹⁰ One of five orders that are now considered to be artificial as they comprise unrelated families. The term is now obsolete, but it was still used by Gould (1865). Rasorers (Latin) = scratchers.
- ¹¹ Insessores = sitters (i.e., perchers).
- ¹² Grallatores = runners on stilts (i.e., waders).
- ¹³ Perhaps an allusion to New Zealand Little Bittern (*Ixobrychus novaezelandiae*), otherwise unknown from the North Island (HANZAB vol. 1B:1045).
- ¹⁴ See Colenso (1844).
- ¹⁵ In a letter to Sir William Hooker (29 September 1848), Colenso mentioned that he sent one skin to Lord Derby and had only seen four of these birds, which he called *Kotuku*, in 14 years' residence in North Island (Bagnall and Petersen 1948:280).
- ¹⁶ Natatores = swimmers.
- ¹⁷ Not listed in Hutton and Drummond (1923) or HANZAB vol. 2:1385.
- ¹⁸ *Eudypula*. Five species are possible, all vagrant to North Island.
- ¹⁹ Presumably the southern parts of South Island and Stewart Island.
- ²⁰ Raptores = robbers.
- ²¹ i.e., Maori, not European.

- ²² According to Bagnall and Petersen (1948:98, 102), Colenso supplied information to Dieffenbach, so it is possible that some of the following remarks represent unacknowledged observations made by Colenso.
- ²³ The Maori name for *Coturnix novaezelandiae* is listed as Koreke in Hutton and Drummond (1923) and HANZAB vol. 2:973.

NOTES ADDED IN PROOF

1. On pp. 74-75 above, reference is made to a letter (4 September 1850) by Colenso to R. Gunn containing information about the approaching extinction of *Rattus exulans* on North Island. I have since discovered a relevant extract from this letter, published in 1851 in the Proceedings of the Royal Society of Van Diemen's Land 1(1):301.

"I have procured two specimens of the ancient, and all but quite extinct, New Zealand Rat, which until just now (and notwithstanding all my endeavours, backed, too, by large rewards) I never saw. It is without doubt, a true *Mus*, smaller than our English black rat, (*Mus Rattus*), and not unlike it. This little animal once inhabited the plains and *Fagus* forests of New Zealand in countless thousands, and was both the common food and great delicacy of the natives – and already it is all but quite classed among the things which were."

2. Robert McCormick, surgeon on *H.M.S. Erebus*, recorded information about declines of several species during the visit to the Bay of Islands in 1841. He noted (p. 409) that the kiwi was "becoming very scarce...and destined to become extinct," blaming this on introduced dogs and cats. He also recorded that the native rat ("Kiore maori") had "now become nearly extinct" (p. 411).

McCormick, R. M. 1847. Appendix, No. III. Geology of New Zealand. Pp. 404-411 in J. C. Ross, A Voyage of Discovery and Research in the Southern and Antarctic Regions, During the Years 1839-43. Vol. 2. J. Murray, London.

Growth and Life Stages of Ornithology in Museum Victoria

N. W. Longmore¹

ABSTRACT.—With more than 73,000 specimens contained within Museum Victoria the museum has a tradition for producing an overview of the world's avian biota. The major component of the international series was obtained through purchase by Frederick McCoy from John Gould in the mid-1800s; the museums local content came from an assortment of collectors and collections. The efforts of Baldwin Spencer at the commencement of the 20th century were particularly important. Since then, smaller collections and ad hoc contributions by amateurs and professional ornithologists, such as the museum curators including George Mack, Allan McEvey, and Les Christidis continued to enhance the specimens available for study. Knowledge of Victoria's avifauna has increased from the activities of Museum Victoria's ornithologists and amateurs associated with the museum all of whom have contributed to the conservation and knowledge of Victoria's avian biodiversity. In this, amateur ornithologists played an important role through the contribution of valuable material and information about the life histories of bird species.

Asked what are my favoured Museum Victoria objects generally has me hesitate before responding "I have no favourites." The museum is full of exciting specimens and history, thus hampering my decision and captivating my mind. An institution such as Museum Victoria has an attraction because it, like most things, is three dimensional. Then, stretching my imagination, the museum goes a further step by adding a fourth dimension – time; here is a collection that encapsulates time! Museums are repositories of materials sourced worldwide, obtained by generations of hard working explorers, scientists, and amateurs, who all strived towards an ultimate goal. That goal is to form a series of baselines of information for testing hypotheses in the study of biology, in this instance, the biology of birds. In this chapter, I consider the

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contribution of Museum Victoria to our knowledge of the world's birds, but especially those of Victoria.

Generations of outstanding scientists, all with their own specific expertise, have ensured Victoria's natural sciences continued to contribute knowledge to the data bank. The Victorian era and early 20th century produced as well a group of dedicated amateurs who provided others of their time and future researchers with knowledge through specimen acquisition and publication. This history is arranged chronologically, and presents the work of major museum personnel in an attempt to present a coherent story.

STONE BY STONE: BUILDING A COLLECTION

William Blandowski (1854–1859).—Various named and renamed as “Museum of Natural History,” “The National Museum of Victoria,” “Museum of Victoria,” and now “Museum Victoria” was proactive in obtaining large collections of foreign bird material, but it did not neglect the local avifauna. Collecting commenced immediately after the passing of Victorian legislation in the proclamation in 1853 of an Act to create a museum. In 1854, shortly after its inauguration, the Governor Charles LaTrobe, appointed Johan Wilhelm Theodor Ludwig von Blandowski (= William Blandowski) as museum zoologist (Figure 1), with the official title of “Collector”. Blandowski, a Prussian, had initially immigrated to Australia as a miner. He made several short trips to areas local to Melbourne such as the upper Yarra River, central Victoria, and Port Phillip – Western Port regions. The results of these excursions were published in the Transactions of the Philosophical Society of Victoria (1855, 1857). On these trips he collected a number of birds for display in the museum showcases and elsewhere; little was retained for a scientific collection.

In December 1856, a well-equipped museum party, again under the direction of Blandowski, travelled by horse and cart into north-western Victoria on its first major collecting trip and only the second major Government sponsored collecting trip by any Australian institution. The first was conducted by the Australian Museum (see Boles this volume). Included in the party was Gerard Krefft, later to become Curator (= Director) of the Australian Museum, Sydney. From April to November 1857, the museum's team members travelled widely



Figure 1. William Blandowski 1860, museum zoologist and "Collector" 1854-1859. Source: National Gallery of Victoria. Photographer William Blandowski.

using a base at "Mondellimin" station (now known as Chaffey Landing, Merbein) Victoria. Through Blandowski's chronic periods of absence the expedition was left under the control of Krefft. The party scoured the area gathering animals, mainly obtained through barter with the local indigenous groups, to build the museum displays, even venturing

into both New South Wales and South Australia. The precise localities that the expedition visited are somewhat clouded by time and the lack of detailed accounts of their movements. They returned to Melbourne with a large number of birds and other specimens for the infant museum. About 300 are still within the collections, while many others have been exchanged with overseas institutions.

While beneficial to the museum in public relations, science, and collection building there is a dark side to this expedition. Undertones of skulduggery and verbal warfare prevented much of the results from being published and finally a proportionately high number of specimens, together with their documentation, sketches and diaries, were taken to Germany by a disillusioned and vanquished Blandowski. Pescott (1954) mentioned 17,400 specimens (not all of which were birds) as being removed by Blandowski from the expedition camp. After some disagreement he left, travelling first to Adelaide along with the bulk of the material then returning from there to Melbourne by sea. A number of bird specimens, along with much other specimen material, were delivered to the museum. Many of the remaining specimens are considered to be of poor to fair preparation and it could be assumed that specimens accompanying Blandowski on his return to Europe in 1859 may have been of higher quality.

Andrew Clarke (1854–1859).—A prime mover and a staunch museum supporter in these formative years was the Victorian Surveyor General, Captain Andrew Clarke (1824–1902) (Figure 2), a respected and highly enthusiastic amateur naturalist who eventually was elected to the Colonial Parliament. Clarke is regularly mentioned as providing not only specimens, but also supporting the museum through correspondence with the government of the day. In his public position Clarke was able in 1854 to assist the fledgling museum by acquiring space in the Assay Office in Latrobe Street.

The collections remained there for three years. A legacy of Clarke's endeavours is a specimen of the rare Grey Falcon (*Falco hypoleucos*) [NMV 6358] shot in his Melbourne backyard. "A specimen of this excessively rare species flew into Captain Clarke's kitchen, at Merri Creek, after a chicken, which it carried off. It was shot, and is now in the National Museum" (*The Australasian*, 25 September 1869: Vol. 7, no. 182:1). It remains the only recorded occurrence of the species from the vicinity of Melbourne. This was not



Figure 2. Victoria's Surveyor General and co-founder of the museum Sir Andrew Clarke (when British Colonial Governor, Straits Settlements 1873). Source: National Archive of Malaysia. Photographer: G. R. Lambert.

the first bird specimen acquired, that honour goes to a specimen of a "Chestnut-breasted Pelican" (= Little Pied Cormorant *Microcarbo melanoleucos*) from Melbourne and presented to the museum by one "Drew, Esq" according to an article published in *The Argus* on 12 April 1856.

Sir Frederick McCoy (1857–1899).—The museum's first permanent head was Professor (later Sir) Frederick McCoy (1817–1899) (Figure 3). He was appointed to the unpaid position of Honorary Curator of the Museum of Natural and Applied Sciences in December 1857 after having, with others, lobbied strongly for the establishment of the museum. McCoy, an Irishman, had accepted the position of Professor of Natural Sciences at the University of Melbourne and it was only natural that he combined this with his



Figure 3. Sir Frederick McCoy, K.C.M.G, D. Sc, F.R.S etc. ca. 1891. First director of National Museum 1857-1899. Source: Museum Victoria. Photographer: Unknown.

interest in museum work. By 1862, he was successful in having a special museum building constructed within the University of Melbourne. His immediate actions on gaining the museum position were expansion and growth of the museum collections through purchase, exchange, and collection; often these purchases would be completed without money being available for the purchase. Pescott (1954, p. 34) mentioned how McCoy "was forced to write to either the President of the Board of Land and Works or the Chief Secretary asking for additional money to be allotted for the payment of accounts that he had incurred, receiving a corresponding number of requests from the Government in reply reminding him that he must not incur any further expenditure without the consent of the appropriate authorities." The first major exchange was received from the Boston Society of Natural History in 1857; it contained 143 specimens of North American birds including two now extinct Passenger Pigeons (*Ectopistes migratorius*). Also in this task McCoy liaised with such eminent ornithologists as John Gould in England and Edwin Blyth in India.

In negotiations with McCoy, Gould provided thousands of specimens received over a 12 year period (1858-1869). A quoted figure in excess of 10,000 by Pescott (1954) and repeated by Pizzey (1992) was a little ambitious, the real figure being estimated at half that number (extracts of Exchange Schedules from Gould, Museum Victoria Archives). McCoy's ideal was to attempt to gather representative worldwide material, thus creating a museum with a high international standing. He asked Gould to supply "an entire set of generic types of birds," (Pescott 1954 p. 42) that is, species from each of the world's recognised bird genera. He had to ply all his wits to fulfil this dream as financial support was minimal, and based on the museum's archived correspondence it appears he obtained these specimens on credit, paying for them as finances permitted. Gould regularly corresponded with McCoy, providing information on specimens being readied for shipment, sending schedules of contents for each, and all the while pleading that his bills be paid.

Unfortunately McCoy's funds became increasingly limited due to a recession and finally dwindled to nothing before he was able to finalise his dream; the last shipments, birds of the South Pacific, filling his quota were quashed. The birds of the Pacific islands remain poorly represented in the museum's collections due to this quirk of economic fortunes. Even so the Gould material remains one of the most important

aspects of the ornithological collections. If there is a downside to this series of study skins, mounts, skeletons, nests and eggs it is that most of the labels are considered to be of a secondary nature, the original or primary labels being mostly replaced by Gould's secretary, John Prince, who relabelled the specimens as mentioned by Pescott (1954) using labels recycled from tickets used by Gould for his hummingbird display at Regent Park, London. The information is limited primarily to species name, a broad locality and sex, only occasionally having extra data. Several important specimens were received and many remain the only examples held by the museum. One such is the Shoebill (*Balaeniceps rex*) an odd and rather ungainly looking bird from North Africa. Apart from its uniqueness, this specimen's collection history is interesting: Gould had described the first bird known to science in the Athenaeum in 1850 and that specimen remains in England. A second consignment of two more birds was also purchased by Gould, one of these being sold to the British Museum while the remaining bird was forwarded on to Melbourne as part of his agreement with McCoy. The history of this second purchase is brief but interesting; Gould obtained the two latest birds through a dealer who had previously bought them from an Arab slave dealer!

Numerous South and Central American species are simply marked with the major commercial ports or countries (e.g., Demerara, Bogota, Colombia, Trinidad, or Guatemala), but our current information indicates that these distributional localities are often erroneous. Among these are possibly several syntypes of birds described by Gould. Because of these labelling problems the matter will remain an historical question requiring an investigation in collaboration with overseas institutions. Other gems received via Gould include some that relate to his own period of Australian exploration. A Yellow-faced Honeyeater (*Lichenostomus chrysops*) collected by Gould himself on the Hunter River, New South Wales, a Brown Booby (*Sula leucogaster*) obtained by John Gilbert at sea between Cobourg Peninsula and Timor, which has been discussed by Fisher and Calaby (2009) and a White-browed Robin (*Poecilodryas superciliosa*) from the Burdekin River, Queensland, collected on the Leichhardt Expedition and later used together with a second specimen to describe the species (Gould 1847, Fisher and Calaby 2009). Another possible type specimen inclusion was one skin of the now extinct nominate form of the Long-tailed Triller (*Lalage leucopyga*) from Norfolk Island. This particular

specimen has a rather unfortunate ending, having been unrecognised, it was destroyed as being “useless” sometime prior to 1980—a fate for a number of Gould’s types (e.g., *Aprosmictus insignissimus* in the Queensland Museum) owing to his practice of not always distinguishing such type material in a manner that would ensure its protection and preservation. There are six types recognised from this series of acquisitions with a further 110 plus specimens possibly having some type status—this is currently, albeit slowly, being addressed. The Melbourne collection also contains species now considered extinct such as the Passenger Pigeon, Huia (*Heteralocha acutirostris*), and White-breasted White-eye (*Zosterops albogularis*). In March 1864 a specimen of the Norfolk Island Parrot (*Nestor productus*) was purchased from W. S. Wall, a curator at the Australian Museum, Sydney.

A singularly large consignment of 132 specimen representatives of 80 taxa was purchased in 1859 from a John McGregor of Port Curtis, Rockhampton, Queensland. Among the many skins, all said to be presumably locally collected birds, was a Yellow Chat (*Epthianura crocea*) and a White-fronted Tern (*Sterna striata*). The chat was then the first known record from Queensland; others were later obtained from the nearby area of Torilla Plains, but are held elsewhere. This population, later named as a new subspecies by Keast (1958), was believed to be locally extinct until small numbers in scattered localities were relocated (Houston et al. 2004). The tern is the only known record from central Queensland, if not the only specimen record from that state; its provenance remains questionable as do a number of other skins obtained from McGregor. McCoy’s one apparent misjudgement was the fantastic offer of the egg of the extinct giant Madagascan Elephantbird (*Aepyornis maximus*) in June 1862. For this McCoy paid what was then an enormous sum of £100 to the supplier, M. Laffargue, a Ballarat gold miner. Subsequent examination for its possible content by an Army X-ray unit shortly after the World War II identified the “egg” for what it really was—a plaster cast. Apparently even by 1954 this “egg” had not been identified for what it was (Prescott 1954, p. 47). Strangely, a real egg is also in the collection, this particular curiosity bears no evidence to relate it to McCoy’s purchase and lacks any information as to its provenance.

Meanwhile, apart from specimens obtained by Blandowski or from Gould, a number of local acquisitions were being acquired for the fledgling museum. Many of Victoria’s pioneer naturalists were

habitually sending their specimens to Europe and elsewhere for sale to eager museums and private collectors. Unique Victorian species, such as the Helmeted Honeyeater (*Lichenostomus melanops cassidix*), were among their number. Some of these were collected by the museum taxidermists such as N. Batchelor, who had, among many specimens, collected the type specimens of the Yellow-rumped (= Spotted) Pardalote (*Pardalotus punctatus xanthopyge*) and J. Leadbeater, credited with obtaining the types of the Helmeted Honeyeater. The museum therefore missed out on obtaining many of the local birds, a problem that required addressing, but was later solved by default through the generosity of H. L. White, of whom we will read later.

McCoy had one idea that today seems surprising for a zoologist. He was a creationist presenting his anti-Darwinian ideas both in his university lectures and in the way he organised and displayed the museum exhibits. The popular press of the day often mentioned this peculiarity and diversion from what was becoming a popular culture. Despite his views on evolution, McCoy achieved much, such as in 1864 when he had the museum collections removed from the original building in the old Assay Building in La Trobe Street, Melbourne to new quarters at the University of Melbourne. It was suggested that this move was against the existing government regulations stipulating that the collections were to be housed in the old Assay Building. McCoy responded with the argument that the collections moved were not in fact in the ownership of the museum and therefore he had every right to remove them. Using newspaper articles and accounts of the period, Pizzey (1992) recounted the story of the outrage accompanying this shift, especially since McCoy at that time had not yet been officially appointed as the museum's Curator.

While not an ornithologist, McCoy did describe four taxa including the Helmeted Honeyeater. This subspecies has a distinction of being described both in Australia (McCoy 1867) as *Ptilotis leadbeateri* and in Great Britain as *Ptilotis cassidix* (Gould 1867). Gould, having beaten McCoy into press, has the distinction of having first named the bird. In a second case, the Yellow-rumped Pardalote was likewise about to receive different names: *Pardalotus xanthopyge* (McCoy 1866), *Pardalotus chrysoprymnus* (Ramsay 1867), and *Pardalotus leadbeateri* (Ramsay, as a *nomen nudum* in Newton 1867), based possibly on the same specimens. Ramsay fortunately withdrew his manuscript name after receiving news of McCoy's intended

publication), while the second was mentioned erroneously by Newton (Hindwood 1950). McCoy's small fig-parrot (*Cyclopsitta leadbeateri*) [= *Cyclopsitta diophthalma macleayana*] was pre-empted by Ramsay 1874.

Two species still retain names applied by McCoy *Pardalotus xanthopyge* [= *P. punctatus xanthopyge*] and *Sphenura broadbenti* [= *Dasyornis broadbenti*]. The latter specimen on which the name is based languished for over nine years in the museum collection before being recognised as new to science, despite the collector Kendall Broadbent pointing out the matter to the museum staff. McCoy remained an active force in zoology and Australian natural history until his retirement and death in 1899. Another new species overlooked by McCoy was the White-browed Treecreeper (*Climacteris affinis*), the type specimen of which had been procured during Blandowski's Murray River expedition but not recognised by any of the zoologists as being new. The specimen, along with several other vertebrates included in McCoy's ambitious exchange program, was sent to Edward Blyth in India. Blyth on recognising it as being new subsequently published its description in 1864. Further information regarding McCoy can be found at <http://www.brightoncemetery.com/HistoricInterments/150Names/mccoyf.htm> and his obituary appears in the Victorian Naturalist (Anonymous 1899).

An ever growing number of Victoria's enthusiastic amateurs were meanwhile active in pursuing investigations into the life history and breeding biology of their local, and in some cases, not so local species (e.g., Cotton 1848, Campbell 1881, Belcher 1887a,b). It was not until 125 years after his death that John Cotton finally received recognition through the publication of the work "John Cotton's Birds of the Port Phillip District of New South Wales 1843-1849" (McEvey 1974). Material relating to Cotton is archived at the State Library of Victoria and Museum Victoria. The early papers of Charles Frederick Belcher (1876-1970) (Belcher 1887a,b) resulted in a publication on the birds of Geelong (Belcher 1914), which remains an Australian classic and an antiquarian's delight. Another attempt at a local book production was made by the Reverend J. J. Halley, of Ballarat, in 1871. His book on Australian parrots and cockatoos was published as a subscription issue. Owing to a very poor response by subscribers, only four plates and text for the Sulphur-crested Cockatoo (*Cacatua galerita*), Pink Cockatoo (*Lophochroa leadbeateri*), Regent Parrot (*Polytelis anthopeplus*), and

Superb Parrot (*Polytelis swainsonii*) were issued. Not surprisingly only four copies of this work remain in libraries and it is acknowledged as one of the world's rarest ornithological books. The Museum Victoria copy retains only three plates, missing the Superb Parrot page.

Archibald James Campbell (1881–1929).—The lack of descriptions of the nests, eggs, and breeding habits of many birds was a vacuum that required filling. Archibald James Campbell (1853–1929) (Figure 4), a Customs Officer working for the Colonial Victorian Government, was among the many treading these grounds seeking this knowledge and materials for future research. Campbell's enterprises finally culminated with the publishing in 1901 of his monumental work on the habits and breeding of Australian birds. His previous papers formed the basis for this major publication. The tome became a much admired work and even today its wealth of information has merit and is a deserving legacy to his activities and ambitions. Campbell, while considered an amateur, assumed the role of professional ornithologist making many important discoveries all of which were published in various Australian journals, for example *Southern Science Record*, *Emu*, *Victorian Naturalist*, *Proceedings of the Linnean Society of New South Wales* etc. Strangely, he avoided much publication in foreign journals.

He holds a special position in Australian ornithology as among his various merits, he was one of the founding members of the Australasian Ornithologists Union, (now Birds Australia), and the Bird Observers' Club, (now Bird Observation and Conservation Australia); these two organisations are currently in the process of amalgamation to be known as BirdLife Australia. In Australia he travelled widely, collecting and acquiring by exchange or purchase eggs and skins for his expanding collections. These were not merely pretty objects intended simply for admiration and display. They were the baseline for his enquiries into the natural history he cherished. Later, a number of his skinned specimens and egg clutches were incorporated into the H. L. White Collection, while a smaller number were given to an acquaintance, Joseph Andrews, and there their story vanishes as reference to this person has never been located.

Campbell's affiliation with the museum appears to be minimal, but behind the scenes he provided several valuable specimens to both



Figure 4. Archibald James Campbell 1881-1929, undated. Source: Museum Victoria. Photographer: Unknown.

the skin and egg collections. Another important addition came via his son many years later in the form of several thousand lantern slides. The egg collections included his magnanimous gift in 1915 of his own oology collection, which had formed the basis of his major research and subsequent publications. Other egg clutches have arrived piecemeal, as part of other private collections that have been surrendered or donated to the museum. The egg collection did not come peacefully. Following the death of his first wife, Campbell remarried shortly afterwards much to the chagrin of his daughters who almost immediately took their vengeance. Arriving home at Box Hill he found his possessions and collections placed outside the front door; the only avenue left to him was to remove the egg cabinet and its contents to the museum to ensure their safety.

Apart from his expeditions through Victoria, Campbell's travels included trips to the Bass Strait islands (1883), Western Australia (1889), northern New South Wales (1897-1898), and north Queensland (1885, 1914, 1916). During these excursions he was part of the Victorian Naturalists group visiting Bass Strait, and once as a companion to Henry Greensill Barnard to north Queensland (Campbell and Barnard 1917). Within his home state Campbell often visited the drier north-western areas about the Big Desert, including the mallee and northern areas adjacent to Echuca. Many of these travels are documented in his publications accompanied by his photography (Whittell 1954). Before photography, he had used watercolours, a medium in which he had received training during his youth, to record his visits, and examples of this deft hand are housed in the State Library of Victoria.

Campbell was the author of 23 new bird names. These were species that he had personally collected or specimens that were brought to his attention for description. Some are not recognised today and reduced to junior synonyms, whereas others have been relegated to subspecific rank (Table 1). Only two have retained full species status (both emu-wrens *Stipiturus* spp). Some were acquired during his many local excursions or through his lengthy trips elsewhere in Australia. Specimens of one taxon, *Arses terrareginae*, remain unlocated within the collection and may have accompanied the material receipted by Andrews.

Table 1. Taxa described by A. J. Campbell, sometimes in association with other ornithologists.

<u>Taxon</u>	<u>Year</u> <u>Reference</u>
<i>Arses terrareginae</i>	1895 <i>Proc. R. Soc. Vic.</i> (Ser. 2):25-26
<i>Gymnorhina dorsalis</i>	1895 <i>Proc. R. Soc. Vic.</i> (Ser. 2):202-213
<i>Stipiturus ruficeps</i>	1899 <i>Vic. Nat.</i> 15:116
<i>Calamanthus rubinosus</i>	1899 <i>Vic. Nat.</i> 16:3-4
<i>Ptilotis carteri</i>	1899 <i>Vic. Nat.</i> 16:3-4
<i>Acanthogenys flavacanthus</i>	1899 <i>Vic. Nat.</i> 16:3-4
<i>Malurus whitei</i>	1901 <i>Nests and Eggs of Australian Birds</i>
<i>Aegintha minor</i>	1901 <i>Nests and Eggs of Australian Bird</i>
<i>Malurus elizabethae</i>	1901 <i>Ibis</i> (Ser. 8):10-11
<i>Malurus edouardi</i>	1901 <i>Vic. Nat.</i> 17:203-204
<i>Halcyon westralianus</i>	1901 <i>Emu</i> 1:25-27
<i>Microeca brunneicauda</i>	1902 <i>Emu</i> 2:85
<i>Acanthiza magnirostris</i>	1903 <i>Emu</i> 2:202-203
<i>Acanthiza rufifrons</i>	1903 <i>Emu</i> 2:202-203
<i>Melithreptus carpentariana</i>	1904 <i>Emu</i> 4:70-71
<i>Ptilopus minutus</i>	1906 <i>Emu</i> 5:155-156
<i>Stipiturus mallee</i>	1908 <i>Emu</i> 8:134-135
<i>Pardalotus pallidus</i>	1909 <i>Emu</i> 8:142-148
<i>Falcunculus whitei</i>	1910 <i>Emu</i> 10:167-168
<i>Eopsaltria hilli</i>	1910 <i>Emu</i> 10:167-168
<i>Ptilotis planasi</i>	1910 <i>Emu</i> 10:167-168
<i>Zosterops chlorocephalus</i>	1910 <i>Emu</i> 10:195-204 (with S. A. White)
<i>Halcyon barnardi</i>	1910 <i>Emu</i> 10:338
<i>Erythroriorchis rufotibia</i>	1911 <i>Emu</i> 10:249-251
<i>Stipiturus westernensis</i>	1912 <i>Emu</i> 11:222
<i>Ptilotis subchrysops</i>	1912 <i>Emu</i> 12:19-20
<i>Eopsaltria coomooboolaroo</i>	1913 <i>Emu</i> 12:191
<i>Cinclosoma alisteri nullarborensis</i>	1922 <i>Emu</i> 21:161-162
<i>Calamanthus winiam</i>	1928 <i>Emu</i> 27:223-224 (with A. G. Campbell)

Campbell was also responsible for describing numerous Australian bird nests and eggs for the first time (Campbell 1883, 1890, 1901), often in a fierce rivalry and competition with A. J. North in the

Australian Museum. In consequence both parties regularly ignored the work of the other. This reflects the perceived rivalry between the two states and institutions. Included among Campbell's new descriptions of either or both eggs and nests are: Pied Honeyeater *Certhionyx occidentalis* (*C. variegatus*), Black-tailed Treecreeper *Climacteris wellsi* (= *C. melanura*), Black Butcherbird *Cracticus quoyi*, Southern Scrubrobin *Drymodes brunneopygius*, Slender-billed Thornbill *Geobasileus hedleyi* (= *Acanthiza iredalei*), Topknot Pigeon *Lopholaimus antarcticus*, Green Rosella *Platycercus flavescens* (= *Platycercus caledonicus*), Victoria's Riflebird *Ptiloris victoriae*, Paradise Riflebird *Ptiloris paradisea*, Purple-gaped Honeyeater *Ptilotis cratitia* (= *Lichenostomus cratitius*), Mangrove Honeyeater *Ptilotis fasciogularis* (= *Lichenostomus fasciogularis*), White-plumed Honeyeater *Ptilotis leilavalensis* (= *Lichenostomus penicillatus*), Channel-billed Cuckoo *Scythrops novaehollandiae*, Regent Bowerbird *Sericulus chrysocephalus*, and Southern Whiteface *Xerophila castaneiventris* (= *Aphelocephala leucopsis*).

A. J. Campbell continued to play an active role in the building of the museum's bird collections, much of which extended into the next phase of the story under the direction of Walter Baldwin Spencer. He was also important to the museum for assisting in obtaining the H. L. White material. Strangely, although he had a strong connection with the then National Museum of Victoria, there is no obvious record of him ever receiving an honorary appointment to the institution. In later years his activities became orientated towards conservation. Locally his work can be seen in the establishment of Wattle Park, a small flora reserve near Box Hill, and the Commonwealth Government's declaration of a national Wattle Day. A gifted writer, artist, and photographer his materials are distributed in Canberra (National Library of Australia, Canberra), Melbourne (State Library of Victoria, and Museum Victoria), and with his many descendants. All remain a legacy to his many achievements. An obituary for A. J. Campbell appears in *Emu* (Mattingley 1930).

NEW BLOOD, NEW IDEAS

Walter Baldwin Spencer (1900–1928).—McCoy relinquished his position as museum curator, or Honorary Director, by formally retiring

in 1899. The role of Curator was almost instantly snapped up by the distinguished University of Melbourne zoologist Walter Baldwin Spencer (1860-1929) (Figure 5)—through his own recommendation—he volunteered. The title of Honorary Director remained, reflecting the position occupied by his predecessor. With the culmination of the formative years, the museum under Spencer's direction commenced a new era. For a start, the collection was shifted in 1900 from the University of Melbourne grounds back into a new building in Russell



Figure 5. Frank Gillen, Walter Baldwin Spencer, Director of the National Museum of Victoria 1900-1928 (sitting right), Erlikiliakirra, Chance, and Purula, members of the 1901-1902 Expedition, Alice Springs, Central Australia, 18 May 1901. Source: Museum Victoria. Photographer unknown.

Street, Melbourne. Almost simultaneously Spencer lodged his own collections, primarily from the Horn Expedition of 1894, in the museum. A further large donation in 1902 followed of material collected during his exploits into northern Australia, while accompanied by the South Australian anthropologist F. J. Gillen. Unlike his predecessor, Spencer accepted Darwin's theory of evolution.

Accordingly, he arranged for the museum's new displays including dioramas to be revamped as a reflection of these ideas, while encompassing the biogeography of Australian fauna. He had in 1896 published a report that included a dramatic idea on the composition of zoogeographic regions on the Australian continent (Spencer 1896) and the new displays were directed towards these regions.

Spencer had been involved in a number of expeditions throughout the country, the major one as the leader and zoologist on the Horn Expedition to Central Australia. The results of this expedition even today are the basis of the knowledge of that region's fauna. In 1912, he explored the Top End of the Northern Territory. Many of the specimens obtained on both trips had been previously donated to the museum. While not an ornithologist, Spencer did apply himself to the acquisition of avian material: 445 specimens representing 120 species for the museum's growing collections. All of these bird specimens were prepared by him while in the field. Among them were specimens of the Chestnut-quilled Rock-pigeon (*Petrophassa rufipennis*), Purple-crowned Fairy-wren (*Malurus coronatus*), Dusky Grasswren (*Amytornis purnelli*), and Princess Parrot (*Polytelis alexandrae*). His collections appeared to incorporate specimens of what was available, with no specific study in mind. Still, the results are of growing importance to science as many become threatened or have suffered from range retraction or habitat loss.

Apart from his interests in central and northern Australia Spencer was also active in Victoria and was prominent in the movement for the establishment and preservation of Wilson's Promontory as a National Park. He remained as Honorary Director until 1928 when he resigned and remarried. During this period he decided to study the indigenous natives of the Patagonian region of South America and during this expedition he died at Ushuaia. A specimen of the South American Austral Parakeet (*Enicognathus ferrugineus*) was shot by him in his final days and is held in the museum collection. Further information regarding Spencer can be found at <http://www.unimelb.edu.au/150/150people/spencer.html> and his obituary appears in the *Victorian Naturalist* (Kershaw 1929). Belatedly it may be said that although not an ornithologist, Spencer did describe one new bird species – albeit the sub-fossil remains of the extinct Dwarf Emu (*Dromaeus minor* [= *Dromaius ater*]) (Spencer 1906). This was followed shortly afterwards by a further paper detailing other sub-fossil material, including

mammals obtained from King Island by either him or other museum staff.

James Andrew Kershaw (1901–1931).—Among staff under Spencer's supervision was James Andrew Kershaw (1866–1946). Kershaw had been appointed to the museum as an Assistant in 1883, rising to a Taxidermist by 1891, and finally to the position of Curator of the zoological collections in 1901. Under Spencer's term of office, Kershaw received a number of valuable collections and specimens. During their tenure part of the historic Mawson Antarctic Expedition (1911–1914) zoological collection (88 birds of 21 taxa), the A. J. Campbell oological collection in 1915 (containing 1101 clutches of 525 taxa), and the H. L. White skin collection in 1917 (8,560 skins of 624 taxa which included 34 type specimens) were received.

Henry Luke White's collections and their impact on Australian ornithology.—Of the above mentioned acquisitions, the best known is the Henry Luke White Egg Collection. The entire collection including the study skins is well presented mostly bearing full data and contains a large number of type specimens (Figure 6). Today bird types contained in the museum collection are listed on-line at <http://collections.museumvictoria.com.au/search.php>. As part of the gift agreement, the White specimens remain separate from the general collection. White had had a strongly worded disagreement with Alfred John North of the Australian Museum in Sydney and through the representations of A. J. Campbell, W. B. Spencer and others he was persuaded to place his collection in Melbourne. This vendetta against one man has been well documented (Rasmussen 2001, White 2007). The downside to the argument was that White placed such restrictions on the use of the collection that it has become the bane of the museum and scientists wishing to examine the contents. He forbade any movement of specimens for loan outside the museum apart from specimens he personally required for research. This continues to have major implications limiting the accessibility of the material to researchers. These strict rules regarding use and movement of specimens were never formally committed to paper and were apparently considered a gentleman's agreement. The restrictions placed on the collection and later agreed to in writing by the museum's trustees were: That the collection would be installed in the bird reference room,



Figure 6. H. L. White egg collection received by the museum in August 1927, custom made Queensland Maple cabinet with drawer open, undated. Source and photographer: N. W. Longmore.

which was in the basement of the museum building; that it be kept separate from the museum collection of bird's skins and be called the "H. L. White Collection"; that it be available for reference to members of the RAOU [now Birds Australia and soon to become BirdLife Australia] at any time during official working hours and for the ten years following receipt on one evening each month between the hours of 7:30 and 10:00 pm on receipt of a written application from the RAOU; and, that "no specimens be permitted to leave the Museum on loan or otherwise except in the case of the donor, Mr H. L. White, to whom specimens may be lent on condition that such specimens are returned within six weeks." (Museum Victoria Archives: H. L. White undated)

These conditions as laid down above were accepted in good faith by the Trustees as being a reasonable and workable proposition. The conditions were relaxed on one occasion when, in 1922 on the recommendation of H. L. White, a specimen of the Ringed Plover

(*Charadrius hiaticula*) from the collection was sent on loan to Gregory Macalister Mathews in London. That loan was recorded by Campbell (1924). The cause for this last and special inclusion was in an effort to prevent the Australian Museum, and especially A. J. North, from accessing the material. North, however, had died shortly after the donation in 1917, and it would have been possible at that stage to have the condition relaxed but, for some reason known only to White, it remained unaltered.

Like many collections White's collection contains a small number of specimens bearing incorrect data such as the purported new taxon *Ptilotis carpentariensis* (= *Lichenostomus cratitius*), described as taken from the Gulf of Carpentaria, whereas the species occurs only in the drier regions of the southern portion of the continent. Apart from such small infractions, the collection itself is beautifully prepared and fully documented. Two later donations included major additions to White's collection. Both contained well prepared and well documented specimens procured from graziers, Thomas Phillips Austin (1874-1937) of Cobborah Estate, Cobbora, near Dubbo, New South Wales (464 specimens) and Thomas Carter (1863-1931) from Western Australia (820 specimens). Austin amassed not only these bird skins, gathered from the vicinity of his extensive land holdings, but also a large and important egg collection. The latter is held at the Australian Museum where it had been presented in the 1930's indicating that although a friend of H. L. White, he held no grievances towards that institution. The bulk of the skin collection had either been prepared by Robert Grant of the Australian Museum or demonstrates his skill in teaching others to prepare material using his own unique and beautiful methods. Carter had acquired specimens not only from his own activities in Western Australia, but also through exchange with acquaintances throughout Australia. While his material is well prepared it is certainly not to the same high standards of Austin's.

Almost immediately following the death of H. L. White in 1927 the large collection of bird's eggs White had amassed was transferred from his estate at Belltrees, N. S. W. to the museum to join his important skin collection donated ten years previously. That egg collection today remains a primary source of breeding data in the museum collections. All clutches are wonderfully documented in a catalogue written in beautiful copperplate entered by Max Cobb and Sidney William Jackson; Jackson had been employed as curator of

White's extensive and growing collections. These clutches, together with all the museum's bird records, are available on-line at the museum's website where these electronic entries are accompanied by colour images of each clutch. The egg collection has become a major component in the museum collections, not only for its scientific value, but also through the unique, almost priceless and magnificent Queensland Maple cabinet specifically constructed to house the collection. It contains some 4,799 clutches of 647 species all beautifully displayed.

Meanwhile shortly after Spencer's resignation in 1929, James Kershaw (Figure 7) was appointed Director, a position he only retained for a short period, retiring in 1931. Kershaw's interest in ornithology was evident but still he published little. He did participate in field excursions, such as to King and other Bass Strait islands, the Capricorn Group as part of the 1910 Royal Australasian Ornithologists Union (RAOU) camp-out, and the Claudie River, Cape York, Queensland, accompanying William David Kerr MacGillivray and William Rae McLennan in 1911 (Kershaw 1914, 1915a,b.). Retirement did not curtail his museum interests as he continued in an honorary position thereafter.

Like Spencer, Kershaw had played an active role in the preservation of Wilson's Promontory and had surveyed the wildlife of the area on several occasions. In 1949, his family sold the residue of his private bird collection to the museum. There were over 350 bird specimens, many of which lacked detailed collection data. These were obtained either by Kershaw during his tenure at the museum or from elsewhere, probably by exchange. Kershaw did manage to gain some interesting additions to the museum's collections, albeit through third parties. One such was a specimen of the Blue-faced Parrot-Finch (*Erythrura trichroa*) received in 1920, originally obtained from "northern Queensland" in 1890 (Kershaw 1918). It was the first known occurrence of the species in Australia. The fate of the specimen is unrecorded; it apparently disappeared from the museum annex building in Abbotsford during the process of packing for removal to the Carlton Gardens building in 1999-2000.



Figure 7. Portrait of James A. Kershaw, Director of National Museum 1929-31. Source: Museum Victoria. Photographer: Johnstone, O'Shannessy and Co.

SMOOTH WATERS ALBEIT WITH UNDERCURRENTS

George Mack (1923–1945).—It was during the 1920s that the museum commenced with a policy of employing younger staff. One such appointee was George Mack (1899–1963) (Figure 8). Shortly after the end of the First World War Mack, a Scot immigrant to Australia. By 1923 he had commenced working as an Assistant Taxidermist in the



Figure 8. George Mack, in Brisbane 1955 after leaving Melbourne where he had been Bird Curator 1923–1945. Source: Brisbane Courier Mail. Photographer unknown.

museum and within a decade had assumed control of the bird collections and advanced to the vacated curatorial position in 1935. Mack had a flurry of activity in the form of taxonomic publications although he did not publish regularly. His major contributions were reviews on the Pied and Frill-necked Flycatchers (*Arses* spp.), white-eyes (*Zosterops* spp.), fairy-wrens (*Malurus* spp.), including descriptions of three new subspecies (Splendid Fairy-wren *Malurus splendens aridus*, Lovely Fairy-wren *M. amabilis clarus*, and Purple-crowned Fairy-wren *M. coronatus caeruleus*), and thornbills (*Acanthiza* spp.) (Mack 1931, 1932a, 1934a, 1936). By the time of the centenary of John Gould's Australian visit, Mack had published a short dissertation on Gould correspondence held in the museum archives (Mack 1938). Here Mack mentions the strong association between Gould and McCoy in their efforts to procure material for the museum; this article gives an account of the tenacity of both.

Mack continued supplying short articles for publication, mostly in the *Emu*, including species, such as White-breasted Whistler (*Pachycephala lanoides*), Helmeted Honeyeater (*Lichenostomus melanops cassidix*), Grey-headed Robin (*Heteromyias cinereifrons*), and Malleefowl (*Leipoa ocellata*) (Mack 1933a,b, 1934b,c). Another publication comprised notes on the genus *Orthonyx* (Mack 1934d). In 1933, Mack received from the collector Francis Erasmus Wilson the holotype skin of the Western Whipbird (*Psophodes nigrogularis leucogaster*), and from R. H. Archer a magnificent collection of foreign bird eggs, some 1,082 clutches representing 596 species. Mack's travels were extensive as he visited, as a member of the RAOU's campout, Wyperfield in October 1931, King Island, Tasmania in September-October 1935, and islands of Spencer Gulf, South Australia, between December 1936 and January 1937. On another RAOU campout trip in 1935 an incident was to occur that was to have a major impact on the museum's staff and collections as well as on amateur bird organisations throughout the country.

What happened was the subject of much debate, including a general walkout at the RAOU campout at Marlo Victoria. According to accounts of those in attendance Mack had unceremoniously acquired, without any thought to the other attendees, a specimen of a Scarlet Robin (*Petroica boodang*) taken from its nest within the camp area, much to the distain of fellow campers (Robin 2001). A search of the collections at the museum does not indicate that the bird ever reached

the collections. Such was the hue and cry that a number of the interstate participants, particularly those from New South Wales, immediately vacated the site and returned home. One such was Keith Alfred Hindwood and another was Michael Sharland; their action as leaders of the walkout was to have an input to a later slight by Mack when Hindwood legitimately attempted borrowing a specimen from the H. L. White collection.

Following on from the see-sawing interpretation of White's directive about loans from his collection Hindwood, an honorary ornithologist at the Australian Museum, although aware of this restriction approached the museum in 1939 to borrow a specimen of the Wandering Tattler (*Tringa incana*). Using the collection's conditions of donation, Mack, supported by the museum directorate, refused the application causing more angst among the day's scientific fraternity. Shortly afterwards, and in the same year, the RAOU Council sought to persuade the museum's Director to allow material to be made freely available. This was once more declined, citing the original agreement. Hubert Massey Whittell proposed that legal advice be sought on the possibility of having the condition set aside in the interests of scientific research. Further enquiries indicated that the gift's conditions were not contained in a legal deed, but merely agreed to in correspondence. Still, it was considered by the museum trustees as committing a breach of trust if the condition were altered or ignored. Through the efforts of two museum trustees, they managed to relax the conditions, thus allowing the material to become available for loan resolving "that the trustees authorise the Director, at his discretion, to make available to accredited scientific workers, material from the H. L. White Collection" (National Museum Committee, Archives Museum Victoria, dated 18 December 1941).

Dominic Louis Serventy, of the Council for Scientific and Industrial Research (now Commonwealth Scientific and Industrial Research Organisation or CSIRO), almost immediately requested a loan of specimens to Western Australia. He received his response in a message stating "they will be available when we return to normal conditions"—at the time the Second World War was in progress and normal museum activities were curtailed for the duration. By the war's end in 1945 a new Board of Trustees refused this agreement referring it to the Crown Solicitor. In the following year they advised that the proposal to lend specimens out of the H. L. White Collection was in

breach of the trust governing the collection. The matter rested until 1950 when the Deputy Crown Solicitor's opinion was received stating "I do not agree with this proposition [to lend specimens] as a matter of law and ethically the proposal could hardly be entertained by a body of the standing of the trustees. If a variation of the trust is seriously desired, I would suggest that the trustees instruct their solicitor to apply to the Supreme Court for a variation of the trust pursuant to Part 111 (sections 61 and 62) of the Religious Successory and Charitable Trusts Act 1928." (Act 3765, Victorian Parliament).

In 1975, John McNally, then Director, also opposed lifting the restriction, aided and abetted by Allan McEvey then Curator of the collections, stating that the general bird collection of the museum ought to suffice should loans be required. And here, for the moment, the matter rests. It would appear that the animosity between the two museums reflected, and in some ways still reflects, a long felt competition between the two centres and indeed the cities of Sydney and Melbourne. Over several years following White's death, attempts were made to remove this stricture from the collection, to make it possible for short term loans of material for comparative examination. Each attempt was doomed to failure. The easing of these restrictions is long overdue. It is somewhat amusing that a current Collection Manager overlooking this wonderful collection received his training and was strongly influenced by personnel at the Australian Museum—the institute that incurred these strict provisions and the wrath of H. L. White, especially as it included the management of his collections.

A positive result for the museum from the outcry from the birding fraternity along with the general public on collecting was the eventual outcome for private collections. While Victoria did not boast any large holding of privately accumulated bird skins, apart from those held by the RAOU, there were a number of egg collections in private hands. Owners of these collections were "encouraged" to place their collections with the museum. The move was advanced by the threat of prosecution by government agencies. Such threats were not confined to Victoria; each Australian state was following a world-wide trend in trying to eradicate what was perceived as an unwanted activity, egg collecting, and that was detrimental to avifauna in general. As a consequence a number of smaller collections were received, although, due to a general lack of funding, cabinets and space, these were to remain mainly untouched for over half a century. These collections

have now been brought into order and it is amazing how valuable they are; it is a subject expanded on elsewhere in this chapter.

During the early stages of the Second World War Mack joined a group of American Museum of Natural History (AMNH) zoologists working in south-east Queensland. He remained with them for two months and only left because of pressing work awaiting him in Melbourne. His position in the team was taken up by J. R. Henry who was employed to work part time for the museum as well as for the AMNH. The results were that the museum gained some 300 specimens from the area based around Warwick and the Bunya Mountains. These specimens were of great value, especially as they were accompanied by detailed data. Later, in 1944, it is recorded that Mack had been involved in updating the Australian avian checklist, last published in 1926, and he was gathering information for its production. This publication never eventuated and it was not until 50 years later that a modern checklist was finally published (see under Christidis).

It was obvious that Mack had wanted advancement and, as he had been overlooked for the position of museum Director in his current employment, he sought new fields of advancement. The war years had prevented him from travel and exploration and other activity, as the museum was restricted by a tight wartime budget. In October 1945, he formally resigned to accept the position of Senior Scientific Assistant and Acting Director of the Queensland Museum in Brisbane. Within two years his appointment as Director of that institute was confirmed. It was shortly after this that he managed to influence taxidermist Donald P. Vernon to follow him from Melbourne to Brisbane. In Brisbane, Mack continued his interest in ornithology, but at a slower rate, as he now oversaw all of the museum's daily activities. A brief account of his work in Queensland appears in the Queensland Naturalist obituary (Anonymous 1964).

Honorary appointments.—In Mack's 1936 fairy-wren paper he followed one of his honorary appointees, Archibald George Campbell (1880-1952) (Figure 9), who had been appointed to an honorary position in 1932. An orchardist, but also a competent amateur ornithologist and conservationist like his father, A. J. Campbell (with whom he had co-authored five bird articles), A. G. Campbell had written major revisions of the thornbills (Campbell 1922, 1923, 1925, 1926, 1936) describing ten new forms several of which have now been

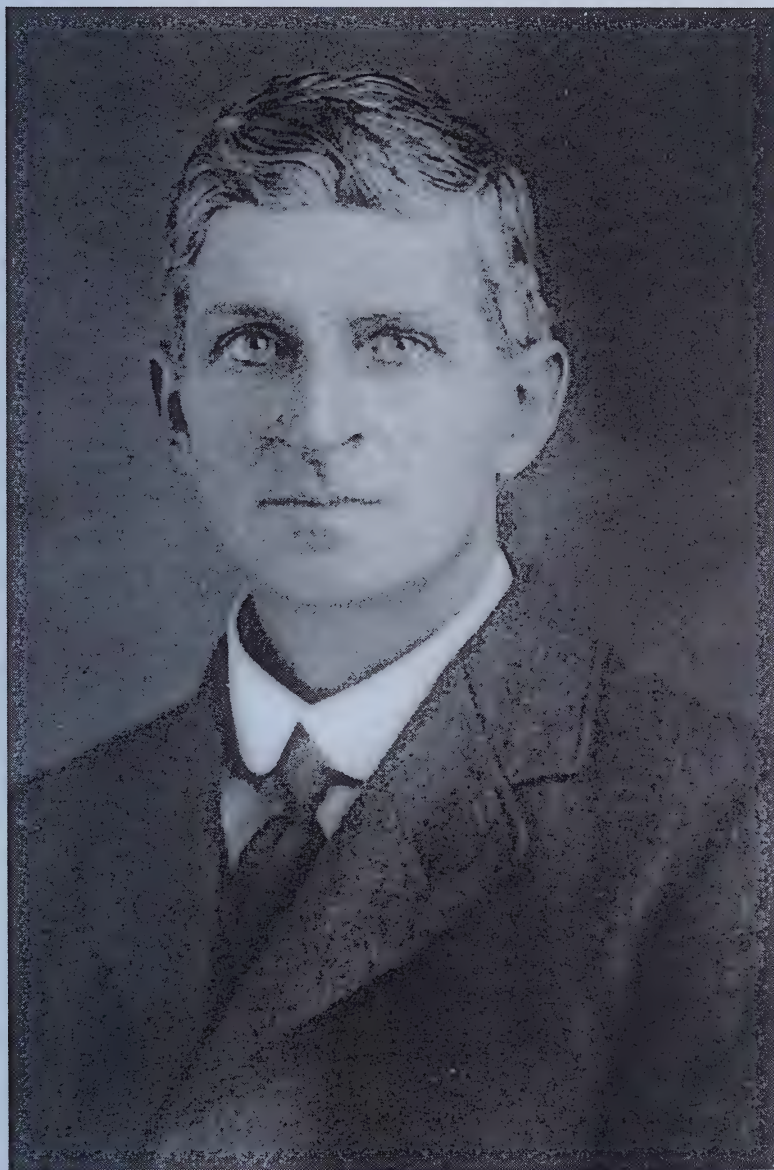


Figure 9. Portrait of Archibald George Campbell, museum associate, undated. Photographer: Unknown. Source: A. B. Campbell.

reduced to junior synonyms (*Acanthiza pusilla leeuwinensis*, *A. p. cambrensis*, *A. p. dawsonensis*, *A. nana belltrees*, *A. apicalis erema*, *Geobasileus uropygialis moora*, *G. u. erema*, *G. chrysorrhous pallescens*, *G. c. westernensis*, *G. c. mallee*). It remains a mystery as to how Mack and Campbell got along; both appear to have had mirrored interests, but apparently failed to collaborate, for example, on the thornbills. There must have also been friction when Mack challenged Campbell's ideas on the white-eyes (*Zosterops*) (Mack 1932b), although if there was it is unrecorded.

A. G. Campbell, while never challenging his father in ornithological matters, showed an immense interest in and knowledge of the subject. Among the many taxa described by A. G. Campbell was a rather enigmatic subspecies that he named *Dromaius novae-hollandiae montanus*. This Emu was recorded as being smaller than other mainland birds and occurred only about the Grampian Ranges of western Victoria. The description was based on his personal observation of birds from that region and, although in his brief description he mentions having examining skeletal material, only the type material (two eggs) exist; no skeletal material from this area is held in the museum collection. Both eggs average smaller than others of the species. Another ponderous point in the naming of this Emu was that the description appeared in a periodic newsletter (Campbell 1939) rather than in an established journal. Obviously Campbell had his reasons, but they remain part of the mystery. A. G. Campbell was less travelled than his father, seemingly confining himself primarily to Victoria and the Bass Strait islands.

By 1932 he had been appointed to an honorary position in the museum and served as such until his death in 1952 when he accidentally drowned in a local creek. In his later years, A. G. Campbell concentrated on his writings, especially on the conservation of both birds and the environment, following a practice established by his late father. Ten years after his death, on 17 January 1962, David Campbell donated to the museum his penmanship, including diaries, correspondence, reprints, and magazine articles, as well as a large number of lantern slides and black and white photographs. The bulk of the lantern slides were taken by father and son, A. J. and A. G. Campbell, while the remainder appear to be copies obtained possibly by exchange with or donation from contemporary photographers. While these images are stored in ideal conditions, their content was never fully

examined until recently when they have been shown to represent information on changes to habitats primarily in Victoria. A similar situation appears with the museum's egg collections, the eggs and their associated data cards indicate a pristine environment for their breeding activities where today many of these areas have been subject to drastic or detrimental habitat alteration. Data from these past records could prove highly beneficial for the reestablishment of healthy native bushland and land management.

Another appointee as honorary ornithologist was Norman Joseph Favaloro (1905-1989). His appointment in the early 1940s is uncertain, because during the Second World War accurate records were not maintained. Favaloro had donated a large collection of study skins obtained from north-western Victoria prior to 1946. He was a barrister with offices at Mildura and Bendigo and was a well-known and competent oologist. He gathered a large private egg collection, which he bequeathed to the museum on his death. He had also acquired collections from other Victorian collectors and these cabinets adorned his home office. The fate of these other collections remains a mystery. Using his museum position he accompanied the ANARE (see Wienecke and Kerry, this volume, and below) into the subantarctic to study the breeding habits of birds and to collect specimens for the museum. Prior to his appointment Favaloro had published a series of articles, particularly on the subject of eggs, and had shown a particularly proficient style of writing and accuracy of observation (Whittell 1954).

CHANGE AGAIN WITH SLIGHT DETOURS

Francis Gordon Elford (1945–1948).—Mack had gone and the curatorial position was again vacant. The museum management was apparently in a bit of turmoil, as under the regulations of the time any current state employee would have preference over applicants from outside the system. So when the ornithologist's position was advertised, it fell on management to follow government policy and consider government officers over all other applicants. This system was in place for many years and resulted in some interesting appointments. On 15 December 1945 the ornithologist's position was filled through the appointment of Francis Gordon Elford (1907-1970) (Figure 10). Elford, not a strong proponent of ornithology, was an education officer with

little experience in museum practice, but possessed a good background in education. He devoted much of his time to public speaking, lectures, writing educational articles, and in the production of educational

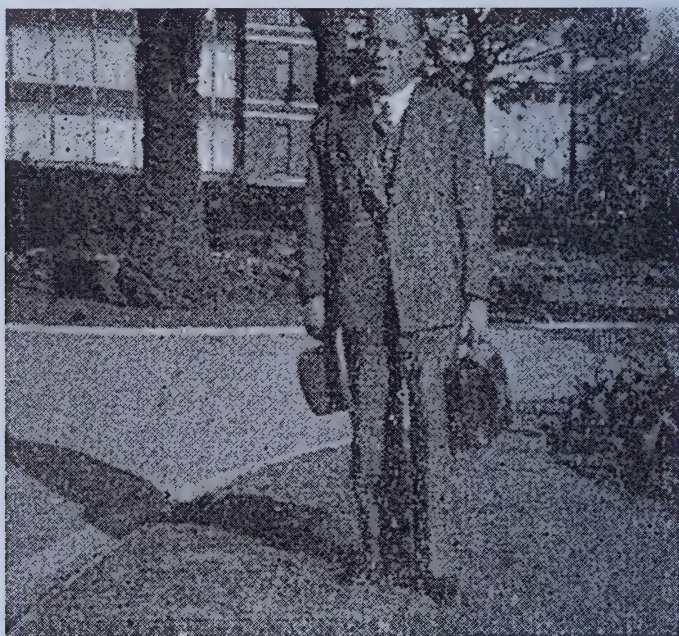


Figure 10. Francis Gordon Elford, Bird Curator 1945-1948, undated. Source: University of Melbourne. Photographer: Unknown.

learning kits for public institutions; the last included mounted bird specimens. What Elford lacked in the way of curatorial ability he countered by being an excellent educator; his main role in the provision of educational material is today reflected in a healthy and ambitious staff of museum personnel dealing with public education. While publication of scientific articles was lacking, he did make advances in the conservation of species that were suffering from shooting, such as the Wedge-tailed Eagle (*Aquila audax*). The museum archives contain some limited Elford documentation mostly based on correspondence with the media and individuals regarding the eagle.

He was provided with technical assistance by Barbara E. Saunders, who was engaged for the period 1947-1948. During his tenure Elford received the Kershaw bird collection and a large lantern slide collection, totalling 2,500 glass slides accumulated by A. G. Campbell. The majority of these are of a scenic nature; but they bear witness to habitat alteration and are a useful tool in land management. Many are accompanied by good data, although the photographer's name is omitted. While numerous slides remain in their original black and white state, others have been enhanced by hand colouring. The slides are broadly centred on three eras, a period of A. J. Campbell, then a combination of both A. J. and A. G. Campbell, with contributions from other photographers of the period, and finally a series by A. G. Campbell.

It was during this period that a serious attempt to undertake systematic surveys was inaugurated. This was stimulated by the Commonwealth Government's massive Snowy Mountain Hydroelectric Scheme as a post-war project. The museum initiated a short-lived series of surveys on the Victorian sector of the Snowy River based at Suggan Buggan, making scattered visits between April 1947 and July 1953. It would appear that Elford did not participate in this survey as there is no evidence of any bird work being conducted in its initial stages apart from a few study skins collected by the mammalogist C. W. Brazenor. On 25 January 1948, two years after his employment commenced, Elford resigned as curator taking up an appointment at the University of Melbourne where he remained for the rest of his working life.

Honorary ornithologists and oology donations.—In 1948, acting on behalf of the museum, Norman Joseph Favaloro (1905-1989) (Figure 11) acquired, through purchase, and deposited at the museum what was known as the RAOU Egg Collection. This large collection had been amassed by members of that body for the scientific dissemination of knowledge on the breeding history of birds. Commenced during the early growth period of the RAOU, donations of eggs were requested from a number of members; its principal contributors appear to have been H. L. White and T. P. Austin. Over the years, it had a quiet, but small growth of additional clutches. A major contribution came through a donation by Albert Charles Stone. His entire collection had been incorporated into the RAOU collection while he was the Honorary Oologist to the RAOU bringing their total number

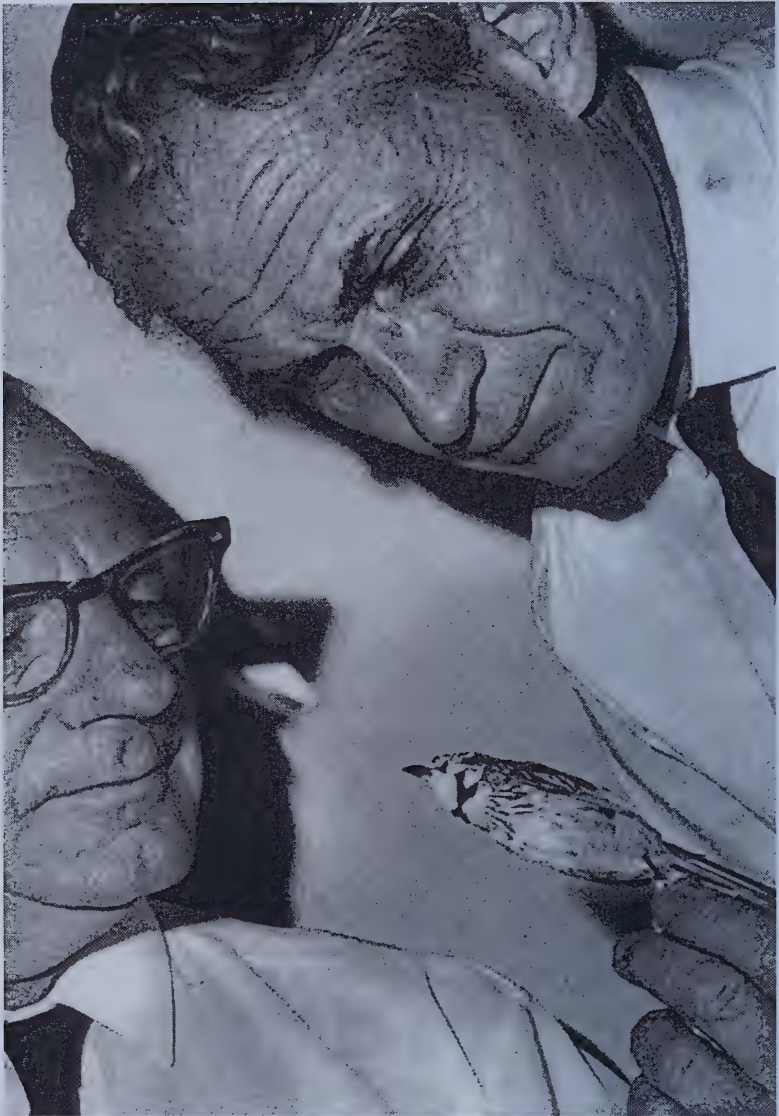


Figure 11. Norman Favaloro (museum associate) discusses details of the Grey Grasswren *Amytornis barbatus* with Allan McEvey, Bird Ornithology (right). Source: Herald and Weekly Times 1968. Photographer: unknown.

to 1218 clutches representing 372 species. When this collection arrived at the museum, it was received as the "RAOU-Stone Collection."

Recently, through the generosity of Mark R. Cabouret of Melbourne, a catalogue originally in the possession of Stone, was examined that clearly separates these two collections by listing the Stone material in their entirety. An active member of the RAOU Favaloro had, in 1959, been able to purchase from them their collection of 346 study skins, which also were incorporated into the museum's collection. Additional material from the RAOU was sourced over the following years bringing the total to 509 skins representing 268 species. These study skins had been assembled by the RAOU by membership donation. Most of these lack basic data, but others are accompanied by full information regarding their provenance.

Norman Favaloro became a major figure in the collection area, not only in the provision of numbers of study skins all nicely prepared, but also, as previously mentioned, in his voluntary participation in several ANARE voyages into the southern seas, visiting, for example, Macquarie Island twice (in 1950 and 1956) and Kerguelen Island (1951). Here he not only procured specimens for the general collections, but also aided banding programs conducted on Macquarie Island. During these voyages he acquired several egg clutches of subantarctic species for the egg cabinets.

The number of the museum's honorary appointees continued to increase, with Charles Ernest Bryant inducted in 1948, bringing the number of appointees to five by 1950. In 1951, the museum received through donation the residue of the Joseph Gabriel egg collection containing 565 clutches representing 385 species, and in the following year another collection amassed by Frederick Charles Morse with its 370 clutches of 291 species. These acquisitions, although relatively small in number, are of great importance and in combination with all other clutches contribute enormously to the knowledge of breeding patterns and habits of Australian avifauna.

Warren Billingsley Hitchcock (1949–1954).—After the departure of Elford the museum took a major step forward when it appointed Warren Billingsley Hitchcock (1919–1984) (Figure 12) on 28 March 1949 to the position of Bird Curator. Hitchcock had previous employment at the Tasmanian Museum and Art Gallery and the South Australian Museum. He also possessed an impressive record in



Figure 12. Ranger Clarke (left), Warren Billingsley Hitchcock, Bird Curator 1949-1954 (centre), and R. T. M. Pescott, Phillip Island 1954. Source: Denver Museum of Natural History. Photographer A. M. Bailey.

fieldwork. It was during his tenure that many important changes were made to the way the ornithology section was organised. Hitchcock was instrumental in developing a new system for the museum to label and collect data. By the time Hitchcock left the museum, details of breeding condition, moult, and soft part colours were being attached to each specimen. Previously little data apart from the sex, date, locality, and collector or donor had been recorded, there apparently being no accepted methodology in place. This major improvement possibly stemmed from a visit by A. M. Bailey and staff from the United States of America. Following visits of the Director, R. T. M. Pescott, to both the Smithsonian Institution's National Museum, and the Denver Museum of Natural History, joint field work was proposed and in September 1949 American researchers, led by A. M. Bailey from the Denver Museum, arrived to obtain material for an extensive gallery redevelopment in that institution. Melbourne's museum received in

exchange some 800 wonderfully prepared skins of North American birds, each accompanied with complete data and identified to subspecies. These specimens contributed significantly to the limited series of exotic material contained within the museum's collections. A second visit in 1952 the Denver Museum obtained a smaller collection for that American museum.

As with Elford, Hitchcock did not work alone. He had the assistance, in part shared with other sections, of Jeannie P. Mitchell (1949-1951), Mitchell was followed by A. G. C. Bingham (1952 who lasted less than a year). Assistants were expected to work in several disciplines or departments, so they did not specialise in any one subject. Another assistant, A. John Coventry, joined this group towards the end of Hitchcock's tenure. Coventry remained in this position for five years and, after working in numerous roles, was promoted to the position of Curator of Herpetology, where he remained until his retirement in 2000. Apart from the push to enhance the collection by introducing improved practices in data collection, Hitchcock also continued a program of field collection and was an active bird-bander often assisting others by teaching the techniques of this rapidly growing study. He visited regional Victoria in areas such as Suggan Buggan, Mallacoota, and Benetook in 1951-1953, 1952-1953, and 1954. During his employment Hitchcock added over 400 specimens to the collections.

In May 1949, the museum was offered a series of mounted birds from the United Kingdom, principally Scotland, by Mrs. E. W. Chenu of Warragul, Victoria. They had been in her family's possession for some considerable time, as her husband had been a collector of natural history art and objects, and it was decided that they be donated the museum for whatever purposes the museum considered appropriate. Hitchcock travelled to Warragul to arrange for their transfer, and it was there that a surprise waited him. After inspecting the mounted series, which were mostly seabirds secured at Bass Rock off Scotland's west coast, Hitchcock was casually asked if the museum might also be interested in some old bird artworks that might otherwise be discarded. On inspection, it was realised that these were prints from the work of John James Audubon, the famous American ornithologist, artist and author of the fabulous *Birds of America* (Audubon 1827-1838)! They were the first 100 plates in the series. Even in the early post-war period these were valuable works and they were being offered free. An approach was made to the museum's Board of Trustees over this

magnanimous offer and a decision was made to provide funds to the donor in gratitude of this magnificent donation. These works continue to provide inspiration and awe to those who are privileged to view or work with them. From the research of Mark R. Cabouret these plates have been tentatively identified as originally being initially purchased by Sir William Jardine of Edinburgh, his subscription to the work having ceased with the issue of the 100th plate.

During this period of activity the museum developed several new dioramas stimulated by current ideas from North American institutions. These were appreciated by museum visitors and valued as both arresting and informative. Many replaced those earlier dioramas instigated by Spencer, although a number of his original dioramas remained for the next 50 years in areas of the museum such as McCoy Hall. Each diorama typically portrayed a specific habitat and the animal life that might be found there, the habitat backdrop was wonderfully executed and was a credit to the artist as it perfectly depicted the area concerned.

Hitchcock resigned as Curator of Ornithology in 1954, having accepted employment in the Northern Territory (Rowley 2008, Schodde 2008). He was undoubtedly one of the foremost ornithologists of his day. Hitchcock's last field work was with a museum trip studying the zoology of the Lower Snowy River region which had continued since 1947. It appears that Hitchcock did little to document the results of that endeavour, which is somewhat disappointing as the material gathered could have contributed much to the scientific literature; obviously he was in the throes of decision making regarding his departure from the museum at the time. His replacement was, like Elford, another ex-education officer, Allan Reginald McEvey (1919–1996).

Allan Reginald McEvey (1955–1984).—Allan McEvey (Figure 11) commenced as the Curator of Ornithology in 1955 and during his tenure he had the assistance of two technicians, Lorene Reid (1976–1979) and Belinda Anne Gillies (1979–1992). Before their appointment, McEvey had often complained bitterly about the lack of technical assistance. McEvey's work commenced at a leisurely pace, although he was prolific in writing, especially on historical matters. He rose to the position of President of the RAOU. He oversaw that organisations total overhaul in the late 1960s at a time when the organisation was facing serious problems: membership and finances were dwindling, the *Emu*,

their quarterly journal, was falling behind in its production and there appeared to be a general malaise within the group. There appeared to be two factions working apart, one based on the scientific component of the organisation, the other included the amateurs. It was a tough struggle, but owing to external pressure maintained by a strong representation from the scientific community in Canberra, the scientific group won the day. This was a major achievement by the organisation and McEvey as president played a major role (Robin 2001).

McEvey worked collaboratively with several ornithologists, most from Australia but a few from overseas. He co-authored publications in which new species or subspecies were recognised and described; these include *Amytornis barbatus* (Favaloro and McEvey 1968), and the Horsfield's Bushlark (*Mirafra javanica forresti*) (Mayr and McEvey 1960). Otherwise his fieldwork was sporadic, although he had a major interest in the regional avifauna of the Rutherglen district of Victoria, the area of his youth and for which he published a summary of the birdlife and ornithological history (McEvey 1965). His field note books held in the museum indicate that he visited numerous off-shore islands maintaining species lists for each visit. McEvey's activities centred in Victoria and he provided small but important contributions. Art was another passion that led McEvey to study many of the earlier bird artists. He also made major contributions to popularising Australian ornithology and his publications are a lasting record and legacy to Australian ornithologists and to McEvey himself. He published several articles on John Gould and arranged for facsimile editions of many obscure yet valuable works by 19th century ornithologists, such as John Gould, John Lewin, and Joseph Cotton. Among these publications the magnificent reproduction of John Lewin's "A Natural History of the Birds of New South Wales" stands out, a work known from a very few copies and even fewer in public institutions. Other reproductions where he added his expertise include John Gould's "Synopsis of the Birds of Australia." McEvey contributed chapters to the works of others such as in Judy White's (1981) "Notes on the H. L. White Collections" Appendix 3 to Chapter 6, in "The White family of Belltrees." As well he contributed articles on one of his favoured subjects – osteology. One article on osteology written by McEvey also delved into the historical aspect of the subject (McEvey 1969).

In the early 1960's, McEvey was approached by the British Museum (Natural History) to assist in their plan for collecting new

Australian material to improve the rather poor series they held. The BMNH had received a most generous grant enabling them to plan several expeditions across the continent seeking the material they required. McEvey was to act as a local champion to assist in their permit applications and other logistics. Along with W. G. Middleton, he embarked on a lengthy trip across the Nullabor Plain to Western Australia selecting collecting locations for one of the expeditions (McEvey and Middleton 1968). For this a number of duplicate specimens were donated to McEvey and the museum collection by the expedition leaders. Results of their expeditions were written up in a series of technical papers the foremost of which were MacDonald (1973) and Hall (1974). A major find of these trips was the discovery and description of Hall's Babbler (*Pomatostomus halli*) (Cowles 1964).

In 1961, the museum received, on a permanent term loan agreement, from Melbourne University and through arrangement with the Thomson family, the valuable collection of material amassed by Donald F. Thomson. Thomson was a Professor of Anthropology at the university and an acknowledged explorer. During his years of field research in Cape York, Queensland, and Arnhem Land, Northern Territory, he amassed a collection of animal specimens. Many of these represented the traditional foods of the local indigenous people. The collection contained some 630 bird specimens of 211 taxa, mostly obtained from Cape York localities, and each was accompanied by detailed field notes all of which were published in a review of the Cape York birds (Thomson 1935). In addition to the Cape York material, the collection includes species from Victoria and other Australian localities, as well as some from Europe. Unfortunately, specimen collection did not extend to the Arnhem Land component of his research, where he only managed to collect 21 skins (12 species) and 72 clutches (28 species), along with a number of reptiles and mammals.

Acting on advice from international colleagues and bucking the trend in Australia, McEvey commenced building a large collection of skeletal material. This resulted in one of the finest collections of osteological material held in any Australian museum. A rapid growth, combined with an active exchange program with overseas institutions, saw the collection grow from a base of a few hundred skeletons to one in excess of 8,500. The collection contains representatives of most world families and is constantly used for research. It is used by students of avian osteology, and it is regularly used by both anthropologists and

palaeontologists. In collaboration with Walter Bock he published on the skeleton of the endemic Plains Wanderer (*Pedionomus torquatus*) (Bock and McEvey 1969). Also, as previously mentioned, with Ernst Mayr he revised the Australian populations of the Horsfield's Bushlark (*Mirafra javanica*) (Mayr and McEvey 1960). Independently McEvey also prepared a paper on the osteology of three then Australian families Grallinidae (now placed within Dicruridae), Cracticidae and Artamidae (now combined as Artamidae) (McEvey 1976).

Pat Vickers-Rich (Figure 13) was appointed as an Honorary Research Scientist in 1979, and she contributed material and expertise to the osteology collection which was to have an immediate and beneficial impact. Vickers-Rich was experienced in the field of avian palaeontology and had also accepted an appointment at Monash University, Victoria. As part of her research, and that of her students, she organised a skeletal element series for the collection. This was before the recent advances in 3D image capture and computers. It was simply a cabinet with each drawer containing the same element from representatives across different families. The researcher simply had to



Figure 13. Professor Pat Vickers-Rich (museum associate) at the Monash Science Centre with Andy Hunt looking at *Leaellynasaura*. Source Monash University. Photographer: unknown.

identify the elements in their possession and match them to the closest bone in the drawers, they could then move into the main collection to identify the animal they had. This process is under review, although still useful in its current form. In her time at the museum Pat's work lead to a complete overhaul of Australian avian palaeontology. Without the benefit of the ever growing osteology collection this would have been a long process, as material would otherwise have had to be borrowed—much of it from overseas institutions.

One of Vickers-Rich's post graduate students, Robert F. Baird, commenced his doctorate studies using the museum's osteology material, as well as material held at the Monash University and other institutions. Baird's interest was in palaeontology, but because his study area had a close relationship with the modern Australian avifauna, he needed the elements available in the ornithology section. In the course of his studies, Baird identified areas where the collection needed additional material. To assist Baird in expanding the collection, he was appointed an Honorary Associate in 1986, a position he maintained for several years. Baird conducted a number of expeditions around Australia that adding a large and valuable number of fully documented specimens to the collection.

Because of overcrowding at Swanston Street, several disciplines were moved off site to facilities at the Abbotsford Annexe. The entire ornithology collection, which had grown considerably since its last major move in the time of Spencer, was moved in 1977. The collections remained at its new facilities, although substandard, until the move to permanent quarters at the Carlton Gardens in a newly constructed building. McEvey, with his assistant Belinda Gillies, arranged the removal from Swanston Street and the housing of the collections at the Abbotsford annex.

McEvey retired in September 1984 ending of a major period in Australian ornithology. He had overseen the revaluation and restructure of a major non-government ornithological organisation—the RAOU. He also had revisited and impressed upon many the substantial achievements of 19th century ornithologists, albeit with an Australian flavour, through provision of facsimile publications. A major interest was John Gould, about whom he wrote extensively, although primarily to an Australian audience. Yet, during all this time, a vast wealth of Gould specimen material received by McCoy, as mentioned above,

languished in their original tin-lined timber boxes in storage in the basement at Swanston Street and was never studied by McEvey. This is unfortunate, as the material may contain type specimens, a project for future generations.

Left behind in the museum archives were McEvey's many field notebooks, each bearing its own title indicating the district or locality that he had visited. His interest was varied and he had often accompanied others to Victoria's offshore islands. Future reference to these notes will require an understanding of his almost illegible handwriting. During the short interval between McEvey's retirement and the employment of a replacement curator, Belinda Gillies ran the day to day sectional duties attending to specimen acquisition, loans, and general enquiries. It was a time to consider a major overhaul in the way the collection and research were moving.

CONTINUED GROWTH, AND ANOTHER DIRECTION CHANGE

Leslie Christidis (1987–2004).—With the retirement of McEvey ornithology at the museum faced yet another challenge: a vacancy existed and the debate was on. The major question was how to fill the role. Should the museum continue with research on morphological studies, whether from a traditional study skin basis or through osteology? Both would be able to use the extensive collections established by the previous curators and other staff. Alternatively, should the museum follow the current international advances in the study of DNA and phylogenetics? Several highly qualified ornithologists with experience across many of these facets were interviewed for the curator's position and Leslie Christidis (Figure 14), a DNA specialist, was appointed to the position in September 1987. Christidis had gained his Ph.D. at the Australian National University in 1985, with his doctorate on the evolutionary genetics of Australian finches (Estrildidae), before becoming in 1987 a CSIRO Queen Elizabeth II post-doctoral fellow at the Australian National Wildlife Collection (ANWC) in Canberra. Christidis was to remain as Curator until 1996 at which time he became the museum's Head of Sciences. In this role Christidis controlled not only the ornithological collection, but



Figure 14. Les Christidis Bird Curator 1987-2004 in western Victoria 2002. Source and Photographer: N.W. Longmore.

also all of the natural sciences; consequentially the DNA facilities expanded to include these other sections. In 2004, Christidis resigned from the museum to take up an appointment as Assistant Director at the Australian Museum in Sydney.

Following Christidis' appointment there was an immediate change in the way the bird collection was managed. This period also saw the establishment of a DNA laboratory to handle the work that was envisaged. A series of field trips were undertaken in Victoria, the Northern Territory, and Western Australia. His DNA-based molecular work on Australian birds expanded and was supplemented by research into other Australasian taxa.

In his association with the ANWC, Christidis had accompanied their staff on field expeditions through most Australian states. One result from a trip through Queensland and South Australia was the discovery and identification of a new subspecies of Grey Grasswren (*Amytornis barbatus diamantina*). This was described the same year as his appointment (Schodde and Christidis 1987) at Museum Victoria. It

was a great start to what could be an exciting new career. In the 1980's, the RAOU had embarked on one of their biggest and costliest projects the *Handbook of Australia, New Zealand, and Antarctic Birds* (HANZAB). The first volume, in two parts, was published in 1990.

Christidis had offered the RAOU the use of his collections and collection area. For several years a team of RAOU employees based themselves in the museum's ornithology section in Abbotsford and later at the new building in Carlton Gardens. This arrangement had both its benefits and drawbacks. On the positive side the collections were given a thorough examination, and their details recorded for the handbook project. On the negative side there was a sudden requirement for space for the team's examinations areas in which to write. They accessed the general skin collection, and the H. L. White material. From both of these they checked details on the external morphology of colours and patterns, shapes and sizes, and moulting patterns. The museum's range of specimen material was considerable and included many of the recognised species and subspecies in adult condition, and it also provided immature and juvenile plumages. Nonetheless there were gaps, and specimens from other collections in Australia and overseas were therefore accessed and borrowed as required. The Hall Expeditions, which had been supported by McEvey, proved invaluable.

Meanwhile Belinda Gillies remained as Christidis' curatorial assistant until her resignation in 1989. Gillies was replaced by Rory Martin O'Brien who had been employed in temporary positions within the section, as well as contributing to the RAOU's ambitious handbook project. O'Brien became a permanent employee in the section in 1992. The last decade of the century proved to be an active time as the museum prepared for its projected move to new quarters in Carlton Gardens. During this period of high activity Christidis continued his research on avian phylogenetics.

Part of O'Brien's role while employed by the RAOU had been to collect information regarding plumage characters and soft part colours (eye, beak, leg, and bare skin colours). While doing this, it was realised that eye colour differentiation existed between populations of the Masked Booby (*Sula dactylatra*). The difference was initially recognised by the artist who had been employed to depict the species for HANZAB and was published in 1990 as a new subspecies (*S. d. tasmani*) (O'Brien and Davies 1990). The handbook work did not

interfere with Christidis' DNA based research work, a laboratory for this having been constructed by the museum. That laboratory was first managed by Amanda Reid who was replaced by Janette Norman who continued in the role until 2009.

The teaming of Christidis and Norman was seen as a positive thing for both taxonomic studies and the museum, and several major revisions, not only on Australian but non-Australian avifauna were published (e.g. Christidis and Schodde 1991, Norman et al. 1998). Not only were taxonomic revisions being researched and published but also there was research on threatened taxa such as the Black-eared Miner (*Manorina melanotis*) (Christidis 1995). For a while the museum enjoyed the satisfaction of being a leading player in Australasian avifaunal studies based on DNA based research. To obtain material for this fast growing disciple it was necessary to collect material in places where little field work had been previously carried out. Field excursions into the Northern Territory and Western Australia provided the required tissue material, as well as adding to the general collections a number of bird skins of species that previously had been unrepresented or poorly represented in the museum collections.

Approached by the RAOU and their publishers in the late 1980's Christidis was invited, along with Walter E. Boles of the Australian Museum, to commence a project to write an updated list of Australian birds. The previous edition had been published in 1926 and desperately needed revision. Over the seventy intervening years several attempts had been made to organise for a revised edition of this checklist (e.g., Mack in 1944) and several committees had been established by the RAOU to investigate the possibility. All had failed to produce results and only a limited number of amendments had been published. It was no easy task as there had been considerable change in the taxonomy of birds not only in Australia, but overseas. Much of the overseas study had strong implications for the taxonomy of the Australian avifauna. Using DNA results as a baseline, while keeping a watch on other studies of morphology, osteology, and behaviour, a new checklist was published in 1994 nearly 70 years after its predecessor (Christidis and Boles 1994). While this has produced stability there still remains many new questions regarding taxonomic affinities which remain to be investigated. The results of DNA based research continue to stimulate discussion and argument. In 2005 the Bird Observers Club of Australia

awarded Christidis the W. Roy Wheeler Medallion for his activity as both a counsellor and scientist.

Today's museum curator or researcher places a considerable emphasis on molecular studies using frozen tissue samples of avian material, although the collections of skins, skeletons, and eggs remain an invaluable resource and continue to grow. The expansion of tissue collections is basic to resolving the systematic relationships of birds and evolutionary pathways, but these studies provide only part of the answer. The remainder is provided in combination by other parts of the collections and aided by the work of field ornithologists studying both behaviour and ecology of birds. Tissues provide a basis for the modern DNA researcher while other researchers and amateurs with a variety of interests find the general collections of value. Included among the users are the artists who require close inspection to determine colours, shapes, and patterns. Oological collections are being recognised for their beauty and the data that accompanies them. Researchers such as avian osteologists, palaeontologists, and archaeologists also make regular visits to examine the osteology material for comparative purposes.

In today's museum there is a trend towards providing information electronically to staff and to researchers (both amateur and professional) in a quick and accurate way. With the advent of computerised collections information can be transmitted in all forms instantaneously to anyone in the world. Current staff employed in these major projects includes Rory O'Brien and N. Wayne Longmore, who was appointed to the museum staff in 2001. Future examination of much of the museum collection will be available at the touch of a keyboard although the existing systems of hands-on research will never diminish in its attractiveness and allure.

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180 Years of Stuff Birds: Ornithology at the Australian Museum, Sydney

Walter E. Boles¹

ABSTRACT.—Since the formation of the Australian Museum in 1827, ornithology, or at least the collection of bird specimens for exhibition, has been a primary occupation of the institution and continues to the present. The emphasis on public display characterised the Museum for the first 30 years until Gerard Krefft introduced a more scientific approach, starting to build collections for research. This new direction was developed further by Edward Pearson Ramsay, who employed collectors and exchanges and greatly increased the size of the bird collection. It was continued by Alfred John North; however, following his death in 1917, ornithology at the Museum experienced a quieter time, relying on honorary appointments and shared curatorial positions held by staff working principally in other fields. There was a major return to research beginning in the 1950s with the appointment of Allen Keast and then John Disney. Upon Disney's retirement in 1979, the ornithology section operated without a Curator and with reduced numbers of people, but did so successfully with collection management staff, temporary assistance, and volunteers. The collection now holds over 80,000 specimens, prepared in a variety of forms. These have been recently housed in new accommodation. Further reduction of staff in 2012 means that after more than 180 years, ornithology at the Museum again faces lean times.

The Australian Museum, in Sydney, New South Wales, is the oldest natural history institution in the country. In the more than 180 years since its origin, the collections have grown considerably, including over five million insects, more than one million fishes, over 100,000 mammals and birds, over one million archaeological items, over 100,000 ethnographic objects, and more than 70,000 rocks and minerals. Ornithology, or at least the collection of bird specimens, has been an integral part of the institution's endeavours from the start and continues to the present day. There have been peaks of activity, both in collection building and research, but many extended periods of reduced

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productivity as well. After more than 180 years, ornithology at the Museum again faces lean times.

ESTABLISHING THE MUSEUM

Although the Australian Museum is considered to have been founded in 1827, the idea of a natural history museum in the fledgling Australian colony predated that (see Etheridge 1916 and Strahan 1979, from which much of the following early account is taken, for a more complete history of the Museum). The Philosophical Society of Australasia, newly formed, had planned for one in 1821. Unfortunately, despite specimens being acquired for this purpose, the Society folded the following year. It had to wait until 1826, with the arrival of Alexander Macleay, for the idea of a museum to be resurrected.

Macleay (often written McLeay) was a Fellow of the Linnean Society of London and served as its Secretary from 1798 to 1825. He was an entomologist and owned a large collection of insects, reputed as one of the best in the world (see Fulton, this volume). At the request of Earl Bathurst, Secretary of State for the Colonies, Macleay resigned his position with the Linnean Society and, together with his insect collection, sailed to Australia to take up the post of New South Wales (NSW) Colonial Secretary. He arrived in Australia in January 1826.

The plants and animals of Australia were tremendous novelties (“contrarities”) to workers in Europe. Naturalists and museums competed with each other to acquire representatives of these curious flora and fauna, and consequently, there was a strong demand for specimens. Many were shipped back to Europe. Workers there formally described the plants and animals in scientific publications. This made some sense, as there was no one with the training in the fledgling colony to do such study. It is likely that some of the push for an Australian museum came as much from the wish to obtain the “many rare and curious specimens of Natural History” for naturalists in England as it did to enlighten the Australian public. Indeed, Bathurst requested that specimens—“many objects of curiosity to be obtained in New South Wales” (letter from R. W. Hay, Bathurst’s Under Secretary, to Macleay, 18 February 1826)—be procured for this purpose.

In response to Bathurst’s request, Macleay made a proposal through Bathurst’s Under Secretary for the establishment of a museum.

Together with other prominent Sydney figures, he lobbied for a museum and support also appeared in an editorial in the *Sydney Gazette* on 29 June 1827: "Amongst other improvements, in these times, would there be any harm in suggesting the idea of founding an AUSTRALIAN MUSEUM? The earlier that an institution is formed, the better it will be for posterity."

It was Macleay's wish that "a Museum of Natural Productions of the Colony" be run by a scientific society. Instead, on 30 March 1827, Bathurst wrote from Britain to the Governor of the Colony, Ralph Darling:

"It having been represented to me that it would be very desirable were the Government to afford its aid towards the formation of a Publick [sic] Museum at New South Wales, where it is stated that many rare and curious specimens of Natural History are to be procured . . . I am disposed, in the meantime, to allow a Sum, not exceeding £200 per annum, to be disbursed for the purpose of assisting in the accomplishment of this object; and, as one of the first steps towards ensuring its success seems to be the sending out some proper person to assist in collecting and arranging such specimens, as it may be possible to procure in that quarter, I have been further induced to consent to the appointment of a young man to that particular duty, who has been recommended to me as peculiarly fitted for it; and who will, therefore, be immediately sent out to the Colony in the capacity of Zoologist." (letter in Mitchell Library).

The letter arrived in August, and was acknowledged by Darling on 1 December 1827. Soon after, however, Bathurst left the post of Secretary of State to the Colonies, and the process of setting up the museum lagged until mid 1829, when William Holmes was appointed as Keeper of the museum.

THE EARLY YEARS

William Holmes (?–1831), a newly arrived carpenter and joiner, was appointed as Zoologist on 16 June 1829, although the reasons for his selection for this role are unclear. There is speculation that, because of his skills, it was his ability to build display cabinets for the prepared

specimens that was the prime criterion. His annual salary was £130.

The first location of the Museum is uncertain, but it has been suggested that it was in a room of the Colonial Secretary's Office. For the next few years, it was then moved to temporary premises among various government offices around Sydney. In 1830, the Sydney or Colonial Museum, as it was then known, shifted to a shed (the Old Post Office), next to the Judge Advocate's Old Office at Macquarie Place. The *Sydney Gazette* on 13 August 1830 reported:

"The public are not generally aware that a beautiful Collection of Australian curiosities, the property of the Government, is deposited in the Old Post Office. This Museum is under the Superintendence of Mr Holmes, who, between the hours of ten and three, politely shows the same to any respectable individuals who may think fit to call."

Showing visitors around was not Holmes' only task. He certainly collected birds and presumably other animals. It is not known if the first bird specimens of the Museum were collected by Holmes after its establishment or whether some came from the earlier museum established by the Philosophical Society of Australasia (1821-1822).

Unfortunately, ornithology at the Museum did not have an auspicious start. While collecting "Birds and other Curiosities" at Moreton Bay, Queensland, in August 1831, Holmes was killed by an accidental gunshot (Whitley 1961). There is no record of any specimens from this time still in existence, although this is as likely due to the lack of bookkeeping as it is the improper storage of the birds.

In 1831, the Museum moved to the Legislative Council building in Macquarie Street. The clerk to the Council (and later, Colonial Secretary), Edward Deas Thomson (1800-1879), was responsible for its general administration. William Galvin (1787-1873), a former Irish police officer, was transported to New South Wales in 1826 for bayoneting a rioter. He started working as a parliamentary secretary for Deas Thomson in 1829. Following the accidental death of Holmes, Galvin was given the additional duties in 1831 of caring for the Museum's collection. In 1832, he was conditionally pardoned for his crime.

The conditions in the displays at the time were less than satisfactory. In late 1831, on behalf of the Museum, Deas Thompson requested from the Acting Governor a daily allocation of 32 lbs of coal

“for the preservation of the Birds belonging to the Museum deposited for the present in one of the Rooms belonging to the Office” because it was necessary “that a fire should constantly be kept up to dry them” (letter in NSW Parliamentary Archives, 18 November 1831).

Holmes had left a number of bird skins at the time of his death. In early 1834, John William Roach was assigned to assist Galvin by mounting these specimens. Roach was a taxidermist, trained in London, but who had been convicted of stealing a coat at the age of 20. Upon his conviction, he was sentenced to seven years in Australia. Within two months of arrival in late 1833, he began his stint at the Museum. Roach was granted considerable freedom to conduct fieldwork and was assigned to join Surveyor General Thomas Mitchell on his expedition in 1835-1836 as “Collector of Birds.” One member of the trip, Assistant-Surveyor Granville Chetwynd Stapylton, was less than impressed with him, in his journal calling Roach a “rascally bird-stuffer” and “unhanged Scoundrell [sic]” and complaining that “I cannot describe the antipathy I entertain towards this vagabond” (Stapylton’s journal in the Mitchell Library cited by Iredale and Whitley 1968). Roach’s relations with Mitchell himself seemed fine. After his return, Roach was granted leave to formally join the Museum. His position was as Collector and Preserver or “Collector and bird-stuffer” of specimens. For this, he was paid £60 per annum, with £158 allocated for collecting and general expenses. After working at the Museum from 1836 to 1840, Roach resigned and set up his own business in Sydney as a taxidermist, as well as selling live birds (Iredale and Whitley 1962, 1968). He was replaced by William Wall, who began his time at the Museum as collector and preserver.

Specimens were acquired solely for display, there not being at that time such a thing as a research collection of specimens. The Museum’s small public collection received the praise of George Bennett. In his book *Wanderings of a Naturalist in, New South Wales, Batavia, Pedir Coast, Singapore, and China being the journal of a Naturalist in those countries-during 1832, 1833, and 1834* said “the ornithological collection is by far the best, both for the number, and being beautifully stuffed and ‘set up’ in attitudes . . . There are also several of the mammalia, and reptiles of the colony in the collection” (Bennett 1834, p. 67). It is interesting that Bennett urged the display of both sexes and different ages, as well as nests, eggs, and skeletons—a view somewhat advanced over that of merely exhibiting a selection of bright males. At

this time the Museum's allocation was £200:, £70 for cases, and £130 for "the collector and stuffers of specimens of natural history for the collection" (Bennett 1834, p. 67).

Galvin remained in his appointment until the upgraded position of Secretary and Curator was filled by George Bennett, after which he returned to his earlier employment as parliamentary messenger. More information on Galvin is given by Whitley (1966) and Strahan (1979).

The colonial government administered the Museum directly until 1836. Deas Thompson suggested the name Australian Museum in 1834; this was accepted by Governor Bourke in 1836. A Committee of Superintendence was formed to jointly manage the Australian Museum and the Botanic Gardens.

George Bennett (1804–1893).—George Bennett lobbied for the position of Colonial Naturalist in 1833, as did several others, but without success. He subsequently sought the position of Curator at the Museum, and in this he was successful. Bennett was appointed as the first Curator and Secretary in 1835 (Figure 1). The title Curator was then used in the sense that Director is now. (It was changed to "Director and Curator" in 1917, with the "Curator" portion dropped the following year). The duties of the Curator were to supervise staff, prepare reports for the Trustees, prepare public displays, and other aspects of the Museum's scientific role. The role and position of Secretary, concerned with correspondence, minutes, requisitions, and the library, were sometimes also filled by the Curator, sometimes by different people. It was in the latter instance that on several occasions in subsequent years led to serious conflicts with the Curator/Director of the day.

Unlike his predecessors, Bennett had extensive training and knowledge of natural history. He was born in Plymouth, England, and early on began travelling, while studying medicine between trips. Having qualified as a physician in 1828, Bennett was employed as a ship's surgeon, by which means he made his initial visit to Sydney in 1829. He returned to England, during which time he became acquainted with Professor Richard Owen, the renowned English anatomist. The men retained a relationship for more than 60 years, regularly corresponding and Bennett sending specimens to Owen.

Bennett again visited Sydney in 1832, spending seven months, much of it along the western slopes of the Dividing Range of New South Wales. Based on this and other trips outside Australia, he

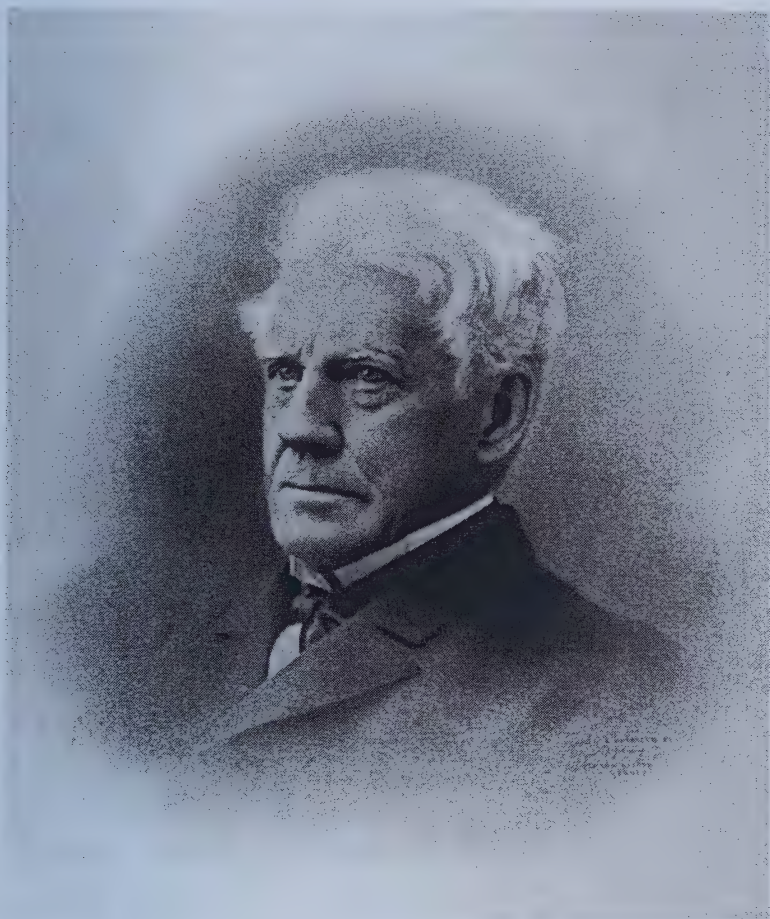


Figure 1. George Bennett, first Curator (then equivalent to Director), 1835-1841. Courtesy Australian Museum Archives AMS160/7.

published *Wanderings of a Naturalist in New South Wales . . .* in 1834 (Bennett 1834). After another short stay in England, Bennett returned to Sydney in 1835, where he remained, establishing a successful medical practice. He also was actively involved in the Zoological Societies of both London and New South Wales, the Linnean Society of London, the Botanic Gardens in Sydney, and the fledgling Australian Museum.

He compiled the *Catalogue of Specimens of Natural History and Miscellaneous Curiosities deposited in the Australian Museum* (Bennett 1837). This showed that, among other specimens, there were "317 supposed species of Australian birds and twenty-five exotic birds" (Strahan 1979, p. 18). In the Catalogue, Bennett proposed two names, *Limosa australis* [= *Limosa lapponica baueri*] and *Columba palustris* [= *Ocyphaps lophotes*]; both are *nomina nuda*. He also sent specimens to Owen in England for the purpose of getting new taxa described and named. Bennett kept a busy schedule. To supplement his Museum salary (initially £200, reduced to £100 in 1841), he also maintained a private medical practice, was Inspector of Abattoirs, and was involved in the supervision of the hanging and dissection of criminals.

Bennett resigned in July 1841 and returned to his medical practice and travels. From 1853 to 1874 he was an elected trustee of the Museum. It was also during this period that he published his second book, *Gatherings of a Naturalist in Australia: Being Observations Principally on the Animal and Vegetable Productions of New South Wales, New Zealand, and some of the Austral Islands* (Bennett 1860). This was perhaps the outstanding work on Australian natural history of that time.

Bennett has been called "the greatest of the doctor-naturalists of Australia" (Coppleson 1955). His involvement with birds was more limited than with some other groups, notably plants and the Platypus (*Ornithorhynchus anatinus*). Nonetheless, he had an active involvement with the Acclimatisation Society (established to "enrich and improve" the Australian fauna by introducing animals from Britain and elsewhere) and acted as Sydney agent for the famous English bird painter, John Gould. Bennett is commemorated by the scientific names of a number of plants and animals, including Bennett's Owlet-nightjar (*Aegotheles bennettii*) (Salvadori and D'Albertis 1875) and Dwarf Cassowary (*Casuaris bennettii*) (Gould 1857). Gould named the latter species before a specimen had been received in England, basing his description on one given by Bennett in a letter. Coppleson (1955) and Chisholm (1966) gave accounts of Bennett's life and Strahan (1979) discussed further his period at the Museum.

William B. Clarke (1798–1878).—Bennett's successor was William Branwhite Clarke, a clergyman and a geologist. Cambridge

educated, he arrived in Australia in 1839. The following year he joined the Museum's Committee of Superintendence, while also serving as Rector of Willoughby, a position he held for 26 years. Following the departure of Bennett, Clarke became Curator and Secretary in 1841. He held these roles until 1843. His ornithological contributions were few: three short notes describing the fossilised bones of large flightless birds ("Dinornis" = a dromornithid bird) (Clarke 1869, 1870, 1877), among the first statements on this group of extinct endemic birds. Clarke is far better known for his geological impact. He is remembered as the "the Father of Australian Geology."

In late 1841, the Museum still lacked a permanent home, at this time being temporarily housed in the recently built Darlinghurst Court House.

William S. Wall (1815–1876).—Roach's replacement at the Museum was William Sheridan Wall (Figure 2). Born and raised in Dublin, Ireland, he was involved as a cataloguer at the Royal Dublin Society's museum, where his father was a porter. He also apparently gained taxidermy skills during this period, for there are several mentions of "Mr. W. S. Wall, Bird Preserver, Dublin" (e.g., Anonymous 1835, Thompson 1842, Society for the Diffusion of Useful Knowledge 1843, Yarrell 1843). In 1840, he and his brother, Thomas Wall, arrived in Sydney. Thomas worked as a collector at the Museum in 1858. He was sent on collecting trips to various locations, acquiring and preparing specimens for the Museum. Thomas was the naturalist with the ill-fated Edmund Kennedy's 1848 expedition from Rockingham Bay to Cape York. On this trip he collected over 300 specimens, among which was the first Australian specimen of the Southern Cassowary (*Casuarius casuarius*). William Wall named this *Casuarius australis* and reported the circumstances of its discovery in the *Illustrated Sydney Herald* for 3 June 1854. After collecting it, "Mr [Thomas] Wall being most anxious for its preservation had secured it in a canvas bag and carried it to the spot where, unfortunately for him and for science, it was lost." It was also noted that "the flesh was eaten and found to be delicious; a single leg afforded more substantial food than ten or twelve hungry men could dispose of at a single meal" (Wall 1854). Regrettably, the cassowary specimen was not the only thing lost on this trip. Thomas died during the expedition.

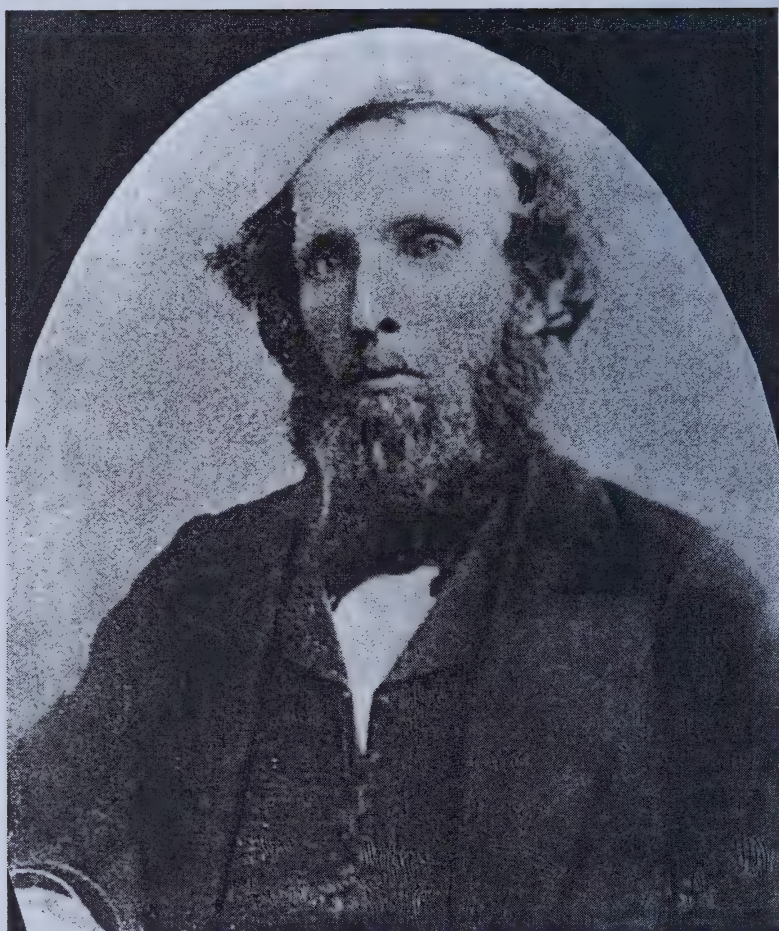


Figure 2. William Sheridan Wall, who first worked for and then took over as Curator from William Branwhite Clarke, 1844-1858. Courtesy Australian Museum Archives AMS391 M01900-1.

Despite his official roles as collector and preserver, William Wall was the day-to-day manager of the institution because Clarke lived at Parramatta, about 25 km (15 miles) from the Museum, from where he “conducted most of his official correspondence” (Strahan 1979, p. 18) and rarely visited the Museum. Upon Clarke’s departure in 1842, Wall was appointed Curator of the Museum. This involved showing visitors

around, collecting and preparing specimens, and articulating skeletons. Among most significant of his activities were articulating a giant fossil marsupial *Diprotodon* skeleton and later that of a Sperm Whale (*Physeter macrocephalus*) in 1849-1850 (Wall 1887), a particularly popular exhibition. Wall was also a skilled natural history artist and, in addition to his curatorial duties, contributed drawings to the *Illustrated Sydney News*, among other publications.

Another peculiar role was looking after the Museum's menagerie. This was established to house a few animals that were to be kept until they died, at which time they would be prepared as skeletons. Most never made it into the collection. Before the remaining animals were given away, they included a Tiger (*Panthera tigris*), Grizzly Bear (*Ursus arctos*), tortoise, and Brolga (*Grus rubicunda*).

In 1844, Wall undertook what must be one of the most shambolic field trips in the history of the Museum. He set out to make a collecting trip to Gundagai on the Murrumbidgee River, about 370 km (220 miles) south of Sydney, at the time connected by a road and weekly coach service. The trip was under the direction of George Macleay, who was not participating, but was responsible for its supply. Macleay had a farm at Camden, 60 km (36 miles) south of Sydney, and it was from here that Wall began his trip. He began the journey with three yoke of oxen, three drays, and £2 15s. Almost immediately, his draught animals began to die. It rained much of the time, leaving Wall drenched and his bedding soaked. Two weeks into the trip, he was confronted by a bushranger, demanding tobacco. He was occasionally ill and frequently sore. In his unpublished journal, Wall (1844-1845) remarked "to describe the misery [sic] which I am placed in is impossible" (13 October). At the end of the first two weeks, Wall had managed to go 110 km, during which time he had remaining a pair of ailing bullocks, a single dray, no money, and almost no food. He was forced to beg potatoes from local settlers. Unable to continue, he walked back to Camden, and resupplied himself with more bullocks. Unfortunately once again his animals started to succumb.

Wall wrote to Macleay requesting instructions, while informing him that the bullocks were all dead or lost and that he had not eaten for two days. While waiting for a response, he noted in his journal "not a single specimen worth shooting either for Eating or Preserving such a miserable place as this for specimens I never was in . . . had the rain

continued much longer everything we had must have perished . . . we were without provisions of any sort and had to go to bed with nothing but a drink of sugar and water . . ." (17 October) (Wall 1844-1845). Wall had the added problem that "my Boots have no souls [sic]" (24 October). Fortunately, Macleay sent two teams of horses within a few days, permitting Wall to complete his journey to Gundagai in a week. Less fortunately, the horse teams returned to Camden, leaving Wall to his own resources and ability to solicit support from local settlers. He collected as best he could under the circumstances, although lacking some of his essential equipment.

After four months, no plans had yet been made for his return to Sydney. Macleay sent word that, as the Museum lacked the money to pay for him to get back, Wall had to remain until such time as an allocation of funds was made by the Treasury. Wall continued to accumulate a string of IOUs for accommodation and transportation during this period. Finally on 24 January 1845, Wall received the money that allowed him to return to Sydney, arriving back at the Museum on 2 February. Despite all the disorganisation and personal travails, he collected 138 birds and a selection of other animals. Wall noted in his journal a bird he called Bugernigang or Bugerrigang Parrot—his handwriting is not clear—one of the first known uses in English of the name that is now *Budgerigar* (*Melopsittacus undulatus*).

The "rascally" habits of Wall's predecessor Roach surfaced again in 1847 when the latter, now privately employed, misrepresented himself as the Museum's Curator to take possession of a rare baby Dugong (*Dugong dugon*) that had been shipped from Queensland. Wall was eventually able to intervene and reclaim the specimen.

Negotiations to erect a new building on the William Street site, where the Museum remains today, were underway. Funds were allocated in 1845, and foundations laid in March 1845. Owing to various delays, however, and despite assurances from the Government Architect, the new building was not completed until 1852. When the Australian Museum Act was passed in 1853, with management by a Board of Trustees, the institution had become far less ad hoc than it was at times in its earlier history.

When George French Angas joined the Museum in 1853 as Secretary, it added confusion to the undefined division of administrative responsibilities between him and Wall. Tensions grew between the men over the roles and authority of their relative positions

(and over the habit of Wall's dog of defecating on the Museum stairs). At the end of 1858, owing to ill health, Wall retired (or was retired). He spent some time around Rockhampton, Queensland, collecting insects for the Museum, as well as for William Sharp Macleay and some European museums, before returning to Sydney, where he was involved in local affairs at Randwick. Further discussion on Wall's expedition and his conflict with Angas are given by Whitley (1965) and Strahan (1979).

START OF A SCIENTIFIC COLLECTION

Simon Rood Pittard (1821–1861).—Following Wall's departure, there was a push to find a new Curator and to expand the museum. The plans also included eliminating the position of Secretary and including that role among the Curator's other duties. Trained and recommended by Richard Owen, Simon Rood Pittard was appointed Curator while still in London. It was not until he arrived in Sydney that he was informed about the additional secretarial duties. No additional salary was offered to compensate for these extra duties. Gerard Krefft was hired as a scientific assistant to Pittard in 1860, with the understanding that he would take on the various clerical aspects of the Museum's running. Pittard was ill when he arrived in Sydney and died of tuberculosis in 1861, less than two years after assuming the Curator's position. He was succeeded by Krefft.

Johann Ludwig Gerhard Krefft (1830–1881).—Gerard Krefft (Figure 3), as he was usually known, was born at Brunswick, Germany in 1830. He was an accomplished artist and gave up his job as a clerk to go to the United States, gaining employment as a draughtsman.

To make extra money, he copied some of John James Audubon's plates from a copy of *Birds of America* in the New York Mercantile Library and sold them. This earned him sufficient money to sail to Australia. He landed in 1852, at the height of the gold rush, and spent seven years on the goldfields. In 1858, he was able to utilise his artistic skills by being appointed as painter and naturalist on a collecting trip to the lower Murray and Darling Rivers region of northern Victoria. This expedition, organised by the Victorian government, was led by William Blandowski (1822–1878), then Zoologist at the National Museum of



Figure 3. Gerard Krefft, Curator, 1860-1874, until he was unceremoniously dismissed and physically removed from the Museum. Courtesy Australian Museum Archives AMS160/29.

Victoria. Krefft eventually became leader of the trip when a disgruntled Blandowski took the majority of specimens so far collected and returned to Melbourne via Adelaide, and eventually to Prussia sometime later (see Longmore, this volume). Nonetheless, the trip returned with a number of specimens and drawings and Krefft was engaged by the National Museum to catalogue these.

Designs were underway to expand the Museum at the time of Pittard's death and Krefft inherited the task of seeing these to completion. When the job was done (1861-1867), the exhibition area had been increased three-fold. More importantly from a scientific standpoint, Krefft gave the Museum an elevated scientific reputation internationally. Until this time, specimens were mainly mounted for public display in very crowded cabinets in the galleries (and remained so during Krefft's tenure). Krefft began to acquire specimens for research purposes, developing these holdings through collecting and actively exchanging specimens with European museums. These institutions were eager to acquire examples of Australian taxa.

The Museum also served as a source of specimens from the Pacific, acquired from seaman who collected during stopovers in the islands and subsequently landed in Sydney. This practice was not universal and had to be encouraged. P. L. Sclater, of the British Ornithologists' Union, expressed a prevailing sentiment: "I trust that our Corresponding Member Mr. Krefft and numerous other friends in Sydney will use their best endeavours to persuade the owners of the vessels which, as I understand, are trading between Sydney and these islands." (Sclater 1869, p. 126). This reflects the attitude that Australian workers were often then regarded as primarily providing a service for British scientists.

Krefft confronted this belief by pursuing his own research program. In so doing, he gained a distinguished standing as a scientist, moving from merely "collecting and preserving" to more scientific endeavours, such as describing new taxa and investigating their anatomy (Strahan 1979). Krefft was also an early supporter of evolution through natural selection as proposed by Charles Darwin. When Richard Owen, a staunch anti-evolutionist, published thoughts on the feeding habits of the fossil Australian marsupial "lion" *Thylacoleo*, Krefft published some scathing letters about Owen's conclusions that it was well equipped for carnivory. Krefft proposed the idea, now known to be quite erroneous, that this fossil animal was like a large melon-eating possum. Among Krefft's notable areas of study were Australian snakes, extinct giant marsupials, and the Queensland Lungfish (*Ceratodus forsteri*). Apart from the collection building, Krefft did little with ornithology. He wrote a few short, mainly popular articles, although he did describe the Southern Cassowary *Casuarius johnsoni* (= *Casuarius casuarius johnsoni*) from north Queensland (Krefft 1867).

Birds named after him are *Pitta krefftii* (now a synonym of the Noisy Pitta *P. versicolor simillina*) (Gould 1868) and the Golden-backed Grackle *Mino krefftii* (Sclater 1869). Among the sources for more information on Krefft are Whitley (1961) and Rutledge (1974).

Several notable collectors and taxidermists worked for Krefft during his time. Two brothers, Robert and Henry Barnes, were employed as taxidermists—the official title was Articulator—with additional roles of carpenter and photographer, respectively. Henry was eventually succeeded by his son, Henry Barnes, Jr. The married couple, Charles and Jane Tost (ca.1817-1889), worked at the Museum for several years. Jane came from a family of taxidermists and was the daughter of Henry Ward, a companion of John James Audubon during some of his travels in America. Her grandfather, father, and brother were also taxidermists. Jane followed this occupation, working for a period in the 1840-1850s at the British Museum under the direction of John Gould. With her husband, also a preparator, and their six children, they sailed to Hobart, Tasmania, in 1856. Jane worked for a while at the Hobart Museum, preparing birds for the Royal Society of Tasmania. In the early 1860s, the Tosts moved to Sydney. Both were employed at the Australian Museum, Charles as a cabinet maker and taxidermist and Jane as a taxidermist. She is thought to have been the first woman to be employed at an Australian museum, and perhaps one of a few in the world in such a position. Furthermore, her wage was equal to that of the male taxidermists at the Museum, a most unusual situation at that time. A serious dispute arising from an alleged attempt by Krefft to frame Charles for theft led to both Tosts leaving the Museum in 1869. Jane and her daughter, Ada Jane Rohu (1848-1928), formed a taxidermy business in Sydney in 1878, just down the street from the Museum. To their supply of mounted specimens and furs, they added artefacts and other curios, as well as opening a small museum on the upper floor, eventually earning “Tost & Rohu, Taxidermists, Furriers and Curiosity Shop” the reputation as “the queerest shop in Sydney” (Sear 2005). The committee selecting examples of work by women in the New South Wales to be exhibited at the Chicago World’s Fair in 1893 asserted that “a good deal of the bird and animal stuffing, done in Sydney, [was] performed by females” (cited in Sear 2005). Jane’s nephew and his sons, still in London, were among the most important taxidermists of their age, even preparing birds for the Royal Family.

Another taxidermist was Eli Waller (?–1881), who was employed

during the period 1857-1860 as “Assistant Bird Stuffer” (Figure 4). Soon after leaving the institution, he set up shop in Brisbane, Queensland, selling specimens, advertising himself as “PRESERVER OF BIRDS, Animals, Reptiles, &c, three years Taxidermist to the Australian Museum, Sydney” (*Moreton Bay Courier* 22 December 1890). During his time in Brisbane, Waller came to be regarded as an authority on the local birds and received newly acquired specimens from collectors such as Kendall Broadbent and, in turn, made these available to other workers. He sold skins to William John Macleay in Sydney (Fulton, this volume) and sent a specimen of the undescribed southern subspecies of the Double-eyed Fig-Parrot (*Cyclopsitta diophthalma*) to John Gould in 1866. Gould named this form *coxeni* in

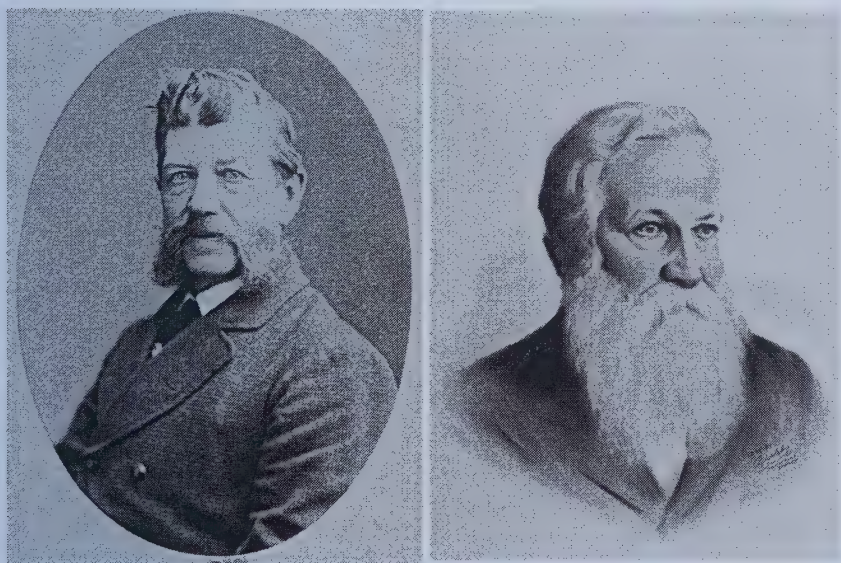


Figure 4. Eli Waller (left), taxidermist, 1857-1860, taken during a visit to London in 1880, some years after having left the Australian Museum. Photograph by Thomas John Barnes & Son; source State Library of New South Wales P1/1892. George Masters (right), collector, 1864-1874, after he had left the Australian Museum and joined the Macleay Museum. Courtesy Australian Museum Archives AMS160/42.

honour of his brother-in-law, Charles Coxen, who was a friend of Waller (Gould 1867). Silvester Diggles (1817-1880), who started, but did not finish, a large work, *Ornithology of Australia* (Diggles 1866-1870), received many of his specimens from Waller. He named Waller's Owl (now Eastern Grass Owl) (*Strix walleri*=*Tyto longimembris*) after Waller "whose scientific and extensive practical knowledge of the birds of Australia, and energy and perseverance as a collector, I am happy to bear testimony" (Diggles 1866, p. 14). Around 1875, Waller appears to have returned to England.

The most prolific supplier of specimens was George Masters (1837-1912) (Figure 4). Born in, Kent, England, and migrating to Melbourne about 1856, he worked as a gardener, but showed a strong interest in natural history, particularly entomology. Masters became Assistant Curator and collector at the Museum in 1864 for the yearly wage of £200. This was contingent upon him selling his private collection and not building a new one. Despite agreeing to these conditions, he ignored them in practice. He travelled widely in Australia on his collecting trips, visiting Queensland, New South Wales, South Australia, Lord Howe Island, Tasmania, and Western Australia. From this field work, Masters developed an understanding of the natural history of Australian animals unmatched by any other worker at the time. His dislike of writing, however, meant that little of it was ever published. From Western Australia, he obtained two of his most important specimens, the rare and geographically restricted Noisy Scrub-bird (*Atrichornis clamosus*) and Western Bristlebird (*Dasyornis longirostris*). So prolific was Masters that at one point he had collected over half of the Museum's natural history specimens, not only birds. At the same time, he was increasing his own collection of insects and selling others to Macleay. In 1874, Macleay enticed Masters away from the Museum with a salary increase of £100 to become Curator of his personal museum. He remained as Curator until 1912, shifting with the collection's transfer to the University of Sydney (see Fulton, this volume). Further information on Masters can be found in Whitley (1958, 1971).

In the early 1870s, relationships between Krefft and the Trust soured, with each side making accusations about the other. One point of contention was the practice of some Trust members of building their private collections by having specimens prepared by Museum staff and obtaining foreign material by exchanging items from Museum's

collections. At the time, a claim levelled at Krefft was that he arranged or encouraged the Barnes brothers to sell indecent photographs from the Museum premises. Krefft did not help his standing by his lack of tact in dealing with Trustees and politicians, but a number of accusations on the part of the Trust appear to have been contrived as a means of getting rid of him.

The disputes escalated and Krefft was eventually fired in September 1874. He refused to leave the Museum and locked himself in his quarters—he, like Wall before him, resided in the Museum building. In response, a Trustee engaged two prize fighters, who broke through Krefft's door and carried him—still in his chair—out of the Museum and deposited him on the footpath. Krefft subsequently received £1,000 following a court verdict that he had been unlawfully dismissed.

MAJOR COLLECTION DEVELOPMENT

Edward P. Ramsay (1842–1916).—Whereas Krefft had poor a relationship with the Trust, his successor fared much better. Edward Pearson Ramsay was the first Australian-born Curator of the Museum (Figure 5). (He was christened Pearson, but adopted Pierson for much of his scientific writing; Hindwood 1970). Ramsay grew up on the Dobroyde Estate, now part of the Sydney suburb of Haberfield and part of an original government land grant. From his early days as a boy, Ramsay displayed an awareness of natural history, no doubt fostered by his physician father, who, like his father before him, had provided specimens to the Natural History Museum, in Perth, Scotland. Ramsay's interests included botany, fish, mammals, and reptiles, but his overwhelming attraction was to birds. Collecting the eggs and skins of birds became a serious endeavour for him and, at the age of 17, together with his brothers, he began to build what would be known as the Dobroyde Collection. Their specimens were augmented by a number from other collectors. Ramsay corresponded with the renowned English ornithologist John Gould, who presented him with signed copies of several of his books. He also provided specimens of various animal groups to Krefft at the Museum, although the latter regarded some of the material offered as rubbish.



Figure 5. Edward Pearson Ramsay, Curator, 1874-1893; following retirement, he remained as Consulting Ornithologist until his death, 1894-1914. Courtesy Australian Museum Archives AMS160/58, ca. 1882.

While studying medicine at the University of Sydney, Ramsay travelled to observe and collect, and began to publish his observations. Although an amateur, he was prolific, producing both papers and letters sent to scientific journals. Ramsay's first paper, on birds breeding in the Sydney area, appeared in *Ibis*, in 1863 (Ramsay 1863), followed by

additional information in subsequent notes (Ramsay 1864, 1865a,c, 1868a). He presented his first paper to a scientific society on the eggs of some Australian birds soon after joining the Philosophical Society of New South Wales in 1865, and subsequently published his findings in its journal (Ramsay 1866a). Eggs were a continuing interest and he described those of various species (Ramsay 1865b, 1867a, 1868b,c), particularly those of cuckoos and their hosts (Ramsay 1865c, 1867b, 1869). Other early publications were a series of papers on specimens from the area of Port Denison (Bowen), Queensland, received from John Rainbird (Ramsay 1865d, 1866b,c).

As skins of new species were acquired from his sources, Ramsay began naming them. He had the unfortunate practice of sending a note on his discovery to a newspaper, frequently including a scientific name, in addition to a submission to a scientific journal. When the newspaper article was published before the formal scientific paper, it became the official original description. One such event surrounded a specimen of a new bird that he purchased from John Macgillivray of Grafton. The bird had been obtained near the Richmond River in late 1865. In September-November 1866, Ramsay and a few colleagues collected on the north coast of New South Wales, the main object of the trip being acquisition of additional specimens of this bird. They were successful, a number of skins being obtained. Ramsay described this new species, the Rufous Scrub-bird (*Atrichornis rufescens*), in a paper published in the *Proceedings of the Zoological Society of London* in early 1867 (Ramsay 1867c), followed by additional comments (Ramsay 1867d). He had, however, sent a short communication to the *Examiner*, the newspaper in Grafton, announcing the find and using the proposed scientific name. This came out in June 1866, and the name officially dates from that publication (Ramsay 1866d).

Another example was the description of the Chowchilla (*Orthonyx spaldingii*), the name of which appeared in the *Sydney Morning Herald* (Ramsay 1868d) before it came out in the *Proceedings of the Zoological Society of London* (Ramsay 1868e).

Ramsay made extensive trips to New South Wales and Queensland as far as Cardwell collecting specimens, which he provided to the Museum. He acquired sufficient information on the avifauna of the Cardwell-Rockingham Bay region to write a series of papers on the birdlife, which continued after he joined the Museum as Curator (Ramsay 1868e, 1875a, 1876a,b, 1877a).

Before working at the Museum, Ramsay made forays into other occupations, with little success. The Dobroyde Estate was split between the Ramsay brothers in 1862, and on his share Edward opened a nursery in late 1867. The following year, in what was a short and ultimately unsuccessful venture, he and his younger brother tried their hand in the sugar industry at Maryborough, Queensland.

Ramsay was, with Sir William John Macleay, a founder of the Linnean Society of New South Wales. That Macleay was at the time also a Trustee of the Museum no doubt assisted in Ramsay's appointment on 22 September 1874 as Curator of the Australian Museum following Krefft's dismissal. Starting before Ramsay joined the Museum, but no doubt intensified by Ramsay's patronage from Macleay, one of the Trustees who had moved to dismiss him, Krefft developed a strong dislike of Ramsay, regarding him as an enemy of long standing.

Ramsay had considerable success in his new position. During his time of service, he expanded the size of the Museum building (Figure 6), increased the number of scientific staff at the Museum from one

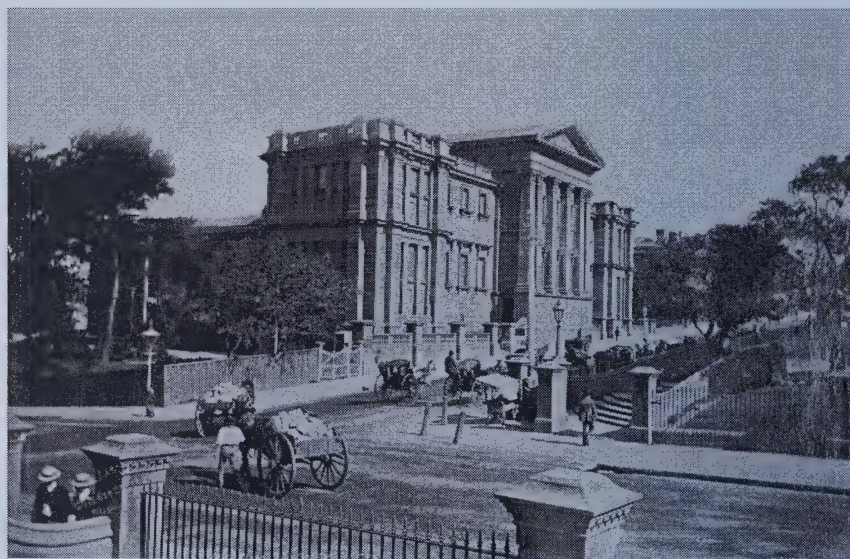


Figure 6. Australian Museum, late 1880s. Courtesy Australian Museum Archives AMS391, source Mitchell Library M897(8).

(himself) to nine, and successfully lobbied the Trust to create a vehicle by which the Museum's research could be published, giving birth to the *Records of the Australian Museum*. The collections also grew considerably. Ramsay acquired many specimens of other animal groups, as well as thousands of ethnographic items. (When most of the latter were destroyed by fire in 1882 while on display at the Garden Palace, site of the 1879 Sydney International Exhibition, Ramsay built the collection up again).

During his time, Ramsay incorporated 17,600 bird skins into the collection. Sydney had become a major port between Europe and the Pacific area, presenting Ramsay with opportunities to exchange specimens with overseas institutions. He also purchased or received by donation specimens obtained by his own collectors or by others on travels through the Pacific islands. Specimens from the islands might be skinned by those trained in this skill, or transported in spirits and subsequently prepared at the Museum.

The growing collections gave Ramsay the chance to describe many new species from Australia and the surrounding region. Identifying Ramsay's type specimens has not been easy, as he (and others) did not always designate these in a clear and unambiguous manner (Longmore 1991a). The situation was exacerbated by his practice of sending type specimens, mainly from the Dobroyde Collection, to European museums, particularly the British Museum (Natural History). Some also ended up in the National Museum of Victoria. Ramsay's type specimens were sometimes marked as such, sometimes not.

In 1878, Ramsay received specimens of birds collected in the Solomon Islands by James F. Cockerell, who had travelled there on the schooner *Ariel* with Captain Brodie. In naming these birds, Ramsay created longstanding nomenclatural confusion. A report on the collection was presented to the Linnean Society of New South Wales in January 1879. He submitted the paper for publication in that society's journal while also sending a note to *Nature* announcing the impending appearance of his paper. The Linnean Society paper contained descriptions of the new species and created a number of new names. Unfortunately, names for these birds were also in the *Nature* note—and a number were not the same, some due to misspellings. Both publications came out in June 1879, but that in *Nature* appeared 11 days before that in the *Proceedings of the Linnean Society of New South*

Wales, and the names in that therefore have priority. Ramsay attempted to correct some of these in subsequent papers, but blamed some of the problems on mistakes that had been introduced by the editors of *Nature*: "I do not hold myself responsible for printer's errors or for the digest of my paper sent to *Nature*."

Those who provided birds for Ramsay collectively travelled through much of the Pacific, and from their acquisitions he described taxa from New Guinea, including the Bismarck Archipelago (Ramsay 1876c, 1877b,c,d, 1878c, 1879a,b,c, 1880, 1882a,b, 1883a,b, 1884a,b, 1885a), Solomon Islands (Ramsay 1879d,e,f, 1881, 1882c,d,e,f,g,h,i,j, 1890a), Vanuatu (Ramsay 1876d, 1878a, 1879f,g, 1888c), Fiji (Ramsay 1876e, 1876g), and Samoa (Ramsay 1878b). Within Australia, through his own fieldwork and that of his collectors, he obtained specimens from throughout Australia, including Lord Howe Island (Ramsay 1875a,b,c, 1877e,f,g, 1878c,d,e,f,g, 1879h, 1885b, 1888a,b). Several collectors also provided specimens from the same trips to William John Macleay for his collection and Ramsay examined these at the Macleay Museum when writing his descriptions of new species (Ramsay 1875d, 1876e). Ramsay rarely published with co-authors. One of his few collaborations was with the naturalist and prolific author Francis Louis de Caumont LaPorte, comte de Castelnau (1812-1880), at the time Consul-General for France in Melbourne, on a collection of birds from the Gulf of Carpentaria (Castelnau and Ramsay 1877).

In all, Ramsay described about 130 taxa, 27 of which remain valid at the species level and 50 at the subspecies level. The remainder are junior synonyms of names described previously by European workers, but for which Ramsay lacked comparative material.

Among the Australian birds he described are the Rufous Scrub-bird (*Atrichornis rufescens*) (Ramsay 1866), Grey-headed Robin (*Heteromyias cinereifrons*) (Ramsay 1875b), Bridled Honeyeater (*Lichenostomus frenatus*) (Ramsay 1874a), Tooth-billed Bowerbird (*Scenopoeetes dentiostriis*) (Ramsay 1876a), and the Cape York subspecies of the Spotted Catbird (*Ailuroedus melanotis maculosus*) (Ramsay 1876a), as well as one of the New Guinea populations (*A. melanotis melanocephala*) (Ramsay 1883b).

Ramsay named many taxa for his colleagues and collectors. His friend Sir William Macleay (1820-1891) is commemorated by Macleay's Honeyeater (*Xanthotis macleayana*) (Ramsay 1875b) and

the northeastern subspecies of Double-eyed Fig-Parrot (*Cyclopsitta diophthalma macleayana*) (Ramsay 1874b). Macleay's wife, Susanna, is honoured by the bird of paradise *Paradisea susannae* (Ramsay 1883b), a junior synonym of Goldie's Bird of Paradise (*P. decora*). The Chowchilla (*Orthonyx spaldingii*) (Ramsay 1868d) and northern form of the Black Butcherbird (*Cracticus quoyi spaldingi*) (Ramsay 1878a) honour Edward Spalding (1836-1900), who provided specimens from Rockingham Bay and Port Darwin; Spalding subsequently was part of the Chevert Expedition to New Guinea in 1875, for a period taxidermist for the Macleay Museum and, from 1880 until 1894 was taxidermist at the Queensland Museum. Bower's Shrike-thrush (*Colluricincla boweri*) (Ramsay 1885b) was named for the young British worker, Thomas Henry Bowyer-Bower (1862-1886), who collected at Cairns and Derby, the latter specimens reported by Ramsay (Ramsay 1887); Bowyer-Bower died tragically at the age of 24.

Some of his collectors' names did not survive synonymy, having been applied to taxa named previously. Thus, George Masters (*Aegialitis mastersi* = *Charadrius mongolus*, Mongolian Dotterel (Ramsay 1876f) and *Platycercus masterianus* = *Platycercus eximius* x *P. adscitus*, hybrid rosella (Ramsay 1877f) and John Thorpe (*Gerygone thorpei* = *G. insularis*, Lord Howe Island Gerygone) (Ramsay 1888a) are connected with names that are no longer valid. The names of Alex Morton (*Chalcophaps stephani mortoni*, Stephan's Dove) (Ramsay 1882c), Andrew Goldie (*Cinclosoma ajax goldei*, Painted Quail-thrush) (Ramsay 1879a) and John Cockerell (White-winged Fantail *Rhipidura cockerelli*) (Ramsay 1879d) at least were retained on one each of several species that Ramsay named.

Missionaries were frequently productive sources of specimens. One was William George Lawes (1839-1907), a British missionary to New Guinea. He collected during his travels, sometimes in connection with others such as Goldie. Ramsay described the bird of paradise Lawes' Parotia (*Parotia lawesii*), from specimens received from the Reverend (Ramsay 1885a). For the Samoa-based Samuel James Whitmee (1838-1925), who contributed to *Nature* on many subjects, from biology to meteors and earthquakes in his region, Ramsay named the fruit-dove *Ptilinopus whitmeei*, now a junior synonym for the Purple-capped Fruit-Dove (*P. porphyraceus porphyraceus*) (Ramsay 1878b). The most productive religious figure was George Brown (1835-1917), a Scottish missionary. During his time he served in Samoa, Fiji,

Tonga, Solomon Islands, Bismarck Archipelago, and New Guinea. Some of his specimens were acquired by the Museum; many more ended up in Europe, where Brown would present his findings to scientific meetings during his visits. For him, Ramsay named the Kolombangara Monarch (*Monarcha browni*) (Ramsay 1882d).

Naval personnel often collected during landfall in their voyages. Three of these were Rear-Admiral George Edward Richards (1852-1927), an English surveyor (*Ptilinopus richardsii*, Silver-capped Fruit-dove; *Monarcha richardsii*, White-capped Monarch) (Ramsay 1881, 1882c), T. H. Lewis (1854-1917), a British naval surgeon and collector in the Pacific Ocean (*Ptilinopus viridis lewisii*; Claret-breasted Fruit-Dove) (Ramsay 1882c), and British Fleet-Surgeon Alfred Thomas Corrie (??-1930), who obtained specimens from Vanuatu and New Guinea (*Ptilinopus corriei*=*P. tannensis* Tanna Fruit-Dove) (Ramsay 1876d). Captain Brodie, who collected with James Cockerell in the Solomon Islands, was honoured with the monarch flycatcher *Monarcha brodiei*, a junior synonym of *M. barbatus* (Black-and-White Monarch) (Ramsay 1879b).

Other colleagues so honoured were the Scottish explorer and naturalist Archibald Mackinlay (1850-1924) (*Macropygia mackinlayi*, Mackinlay's Cuckoo-Dove) (Ramsay 1878a); the German diplomat, colonial administrator and ornithologist Friedrich Hermann Otto Finsch (1839-1917) (*Micropsitta finschi*, Green Pygmy-Parrot; *Ducula finschii*, Finsch's Imperial-Pigeon; *Pitta erythrogaster finschi*, Red-bellied Pitta) (Ramsay 1881, 1882c, 1884a); German trader, explorer, and collector in the Pacific Theodor Kleinschmidt (1834-1881) (*Lamprolia victoriae klinesmithi*, Silktail) (Ramsay 1876g); and English clergyman and ornithologist, Henry Baker Tristram (1822-1906) (*Myzomela tristami*, Tristram's Myzomela) (Ramsay 1881).

During the period 1882-1883, Ramsay began publishing a series of articles resulting from his oological studies, illustrated with hand-coloured plates of the eggs (Ramsay 1882k, 1883c). John Gould, who had been working on Australian birds for some time and anticipated writing a similar tome on Australian eggs, wrote to Ramsay, convincing him to cease publication. Unfortunately, the Gould work never eventuated, and Australia had to wait before a proper reference on eggs finally became available.

Among Ramsay's many publications were four parts of *Catalogue of the Australian Birds in the Australian Museum* (1876-1894), on

which he was assisted by A. J. North. The initial catalogue to appear was birds of prey (Ramsay 1876h), followed by ones on owls (Ramsay 1890b), parrots (Ramsay 1891), and kingfishers (Ramsay 1894). Ramsay's manuscript notes for the remaining species remain in the Museum as one of his legacies. In 1878, he produced *Tabular List of all Australian Birds at present known—showing the distribution of the species* (Ramsay 1878h), which was later revised (Ramsay 1888d). Sharpe (1888) wrote a complimentary review in *Nature*, and it was described in Ramsay's obituary as "extremely useful and . . . followed by the field workers of those days" (Anonymous 1917a).

Eager to learn if individuals of Gouldian Finches (*Erythrura gouldiae*) were different species, Ramsay bred these birds in aviaries within the grounds of the Museum. What he published, however, showed that he had not correctly resolved the question by that time. Initially he thought the black-headed birds were males, the red-headed ones females (Ramsay 1887g). His observations showed him that birds of both colours could breed together. Rather than recognise that there were two morphs involved, he later developed the idea that both sexes acquired the black head after the juvenile plumage, which they retained for a number of years, before both obtaining a red head (Ramsay 1877h). In that paper, he also created the name *Poephila armitiana* for a yellow-headed individual sent to him from northern Queensland by Inspector William Edington Armit.

Ramsay's professional activities were by no means restricted to birds. The extent is illustrated by his collaboration with Richard Owen on remains of fossil marsupials, memberships of the Royal Commission on the Fisheries of NSW, and his role as founding Treasurer of the Entomological Society of NSW. He was also a member of other zoological, botanical, and anthropological societies in England, Scotland, Ireland, and Italy, and travelled to France as a New South Wales member to the Commission for the Paris Exhibition of 1878; the exhibits and photographs won a gold medal and diploma of honour. According to his son, while he was in Europe, Ramsay was asked by the Botanic Gardens to look for new and interesting plants, as a result the Kaffir Lily (*Clivia miniata*) was brought to Sydney for the first time (N. W. Longmore, pers. comm.).

During the nine months in 1883 that he spent in London as Commissioner for NSW and Tasmania at the Great International

Fisheries Exhibition, Ramsay took the opportunity for collection building. As well as organising for the acquisition of the important Day Indian fish collection, he had bird specimens sent to him from Australia in order that he could conduct exchanges in person. Following his time in England, he made rapid visits to contacts throughout Europe in 1884. These included Edinburgh, Scotland, and Florence, Italy, where he met with Enrico Hillyer Giglioli from the Florence Museum. Giglioli was very keen to obtain Australian specimens, encouraging Ramsay by promising him a Knighthood of the Crown of Italy. It transpired that Giglioli received his specimens as part of an exchange, and Ramsay was granted a Knighthood in 1884 (McAllan et al. 2005). For his part in facilitating a bequest to the University of St Andrews, Scotland, Ramsay received an Honorary Doctor of Laws from that institution in 1886.

In 1893, failing health—he had become an alcoholic—forced Ramsay to take extended sick leave, and at the end of the following year, he resigned. The next year, until his death in 1916, he held the title of Consulting Ornithologist.

Ramsay's brother, John Simeon Ramsay (1845-1929), offered the Dobroyde Collection to the New South Wales government in 1896, and this was purchased in February 1898 for £500 through special New South Wales' State Government funding (Hindwood 1970). Around 140 clutches had been given to Frederick McCoy at the National Museum of Victoria (N. W. Longmore, pers. comm.), but the portion received by the Australian Museum comprised 1,712 skins from Australia, New Guinea, and the Pacific Islands, plus 1,602 clutches of eggs. Despite being acquired in 1898, the specimens were not registered until 1912.

While Edward Ramsay had good working relationships with other colleagues in Australia and abroad (Gerard Krefft excepted), a high opinion of his work was not shared by the Italian ornithologist Adelardo Tommaso Conte Salvadori Palcotti (1835-1923). They corresponded regularly and Ramsay named the paradise-kingfisher *Tanysiptera salvadoriana* (= *Tanysiptera sylvia salvdoriana*) (Ramsay 1879a) in his honour. Salvadori, however, was not impressed with much of Ramsay's output. Having previously chastised Ramsay about the nomenclatural mess created for the Solomon Islands birds, Salvadori lamented to his colleague Robert Bowdler Sharpe, "truly this [Tabular List], as all Mr. Ramsay's works, are very poor things! And I am afraid that he knows very little of ornithology . . ." (cited in McAllan et al. 2005, p. 75).

Ramsay received much higher accolades from other ornithologists. His obituary in *Emu* concludes "So has passed one of the most conspicuous of Australian-born workers among the *ornis* of his country" (Anonymous 1917a), while Mathews (1925, p. 111) called Ramsay "The first great Ornithologist produced by Australia." More on Ramsay can be found at in the Records of the Australian Museum (Etheridge 1917), Whittell (1954), Chisholm (1976), Strahan (1979), and Bonser and Bonser (1978).

Although Sharpe's (1879) *Petroeca ramsayi* (= *P. goodenovii*, Red-capped Robin) has been synonymised, several birds still carry Ramsay's name: Azure Kingfisher (*Ceyx azurea ramsayi*) (North 1912); Ebony Honeyeater (*Myzomela pammelaena ramsayi*) (Finsch 1886); and Chestnut-breasted Finch (*Lonchura castaneothorax ramsayi*) (Delacour 1943), a new name for *Donacola nigriceps* Ramsay, which was preoccupied. Masters (1876) and Salvadori (1882) both coined *Zosterops ramsayi*, the former now being the north-eastern subspecies of the Silvereye (*Zosterops lateralis ramsay*) and the latter a new name for the preoccupied *Tephras olivaceus* Ramsay (= *Z. ugiensis*). Mathews (1912a, 1923) created several subspecies named after Ramsay—stone-curlew *Burhinus magnirostris ramsayi*, kingfisher *Halcyon sanctus ramsayi*, honeyeater *Gliciphila modesta ramsayi*, sittella *Neositta albatra ramsayi*—but none survive. His one name that is still in use is the honeyeater genus *Ramsayornis*.

Edward Ramsay's son, John (Jack) Simeon Pearson Ramsay (1881-1981), was born in the Curator's quarters on the top floor of the Museum. In his later years, Alec Chisholm referred to him as the oldest living Museum specimen (N. W. Longmore, pers. comm.). He continued with ornithological involvement, concentrating on photography and bird conservation.

Ramsay's collectors.—The development of the bird collection during Ramsay's curatorship was aided by a number of collectors, both those employed by the Museum and those operating privately and either selling specimens or being hired temporarily to conduct fieldwork.

John Thomas Cockerell provided specimens to the Museum, having corresponded for 20 years with curators at the Australian Museum, Queensland Museum, and South Australian Museum. He was a fine collector, but unfortunately engaged in some disreputable

behaviour with his specimens. He supplied specimens to Silvester Diggles, who described seven new species from Queensland; in fact, none was Australian. During a visit by Ramsay to Brisbane, Cockerell showed him some purported Aru Island birds, which included some with dubious localities. He eventually sent his collection to Britain, requesting his agent to dispose of it. The specimens were sold to the well known English ornithologist, Frederick Ducane Godman, and now reside in the Natural History Museum. Many of the supposed new species were no more than birds already known from parts of Queensland, while some of the Aru Island birds were given Australian localities. The preservation of skins was excellent, but specimens were poorly labelled, further contributing to the problems. It is unsure if the errors originated from Cockerell or his agent, but they remain a headache for anyone using that collection. One of the specimens included was a very rare Night Parrot (*Pezoporus occidentalis*). Mathews (1915) and Pigott (2004) provide more details on this episode. At an inquest sparked by Cockerell's accusations of mismanagement by officials at Somerset, Queensland, one witness testified, "creating mischief appeared to be a family failing of Cockerell and his sons" (Whittell 1954, p. 156). John. A. Thorpe, who had some association with the Cockerells' activities before going on to be the Museum's taxidermist, was absolved from blame by Robert Etheridge, Jr, the Director. (Mathews 1925). There is also suspicion that Cockerell stole specimens, including a Night Parrot, from the Queensland Museum while temporarily employed there and included these in his sale to Godman (Ingram 1986). Another possibility raised is that Cockerell purloined his specimen from the Australian Museum (Olsen 2009), which had a Night Parrot go missing sometime after he arrived in Sydney in 1880 (see Forshaw et al. 1976).

James F. Cockerell was the youngest son of John T. Cockerell. James himself was regarded by other workers as a good collector and preparator. In 1867, he travelled with Thorpe to Somerset, Cape York, where they worked until the following year. One new species obtained on this trip was the White-streaked Honeyeater (*Ptilotis cockerelli* = *Trichodere cockerelli*), named for Cockerell by John Gould (1869). In 1872-1873, James and his father worked near Somerset, Cape York, and in the Aru Islands, and several years later, in 1875, he joined George Brown on a trip to Duke of York islands, via New Britain and New Ireland, collecting along the way. Some of the resulting specimens

were acquired in part by Ramsay for the Australian Museum (Ramsay 1877c,d) and much of the remainder by William Macleay for his own collection. From this collection, P. L. Sclater (1877) named the *Philemon cockerelli* (New Britain Friarbird), while Ramsay (1879b) erected *Rhipidura cockerelli* (White-winged Fantail). Cockerell's next extensive trip was in 1878 aboard the schooner *Ariel*, under the command of Captain Brodie. There appears to be almost nothing known of Brodie. While the suggestion has been made that he was a "blackbirder"—acquiring labourers from the islands through trickery or kidnapping—evidence for this or, indeed, any other activity, has not been forthcoming. Cockerell and Brodie spent much of the year in the Solomon Islands, visiting Guadalcanar, Cape Pitt, Georgia, Savo, and Lango. Ramsay's descriptions of these birds introduced a number of nomenclatural problems, as discussed previously. James Cockerell went on to travel with Samuel White (Adelaide) at Somerset and Aru Islands, and later collected in Australia for the South Australian Museum.

The Scottish-born Andrew Goldie (1840-1891) used his apprenticeship as a gardener to take up the role as nurseryman after migrating to New Zealand, in 1862. When he arrived in Melbourne in 1875, he met the explorer and botanist Ferdinand von Mueller, at whose encouragement he headed to New Guinea, travelling to Port Moresby in 1876 aboard the mission steamer *Ellengowan*. He explored locally, but came down with a serious fever soon after. Following a second attack, Goldie returned to Sydney in December 1876. It was here that he met Ramsay. Arrangements were made for a return trip by Goldie to New Guinea, collecting for the Museum. Goldie was accompanied by two collectors, Alexander Morton and William Blunden, arriving in Port Moresby in July 1877. From there they explored widely, either together or in smaller parties, visiting the Laloki River and Astrolabe Range, and eventually as far as the Louisade Archipelago. At the Goldie River (named by Goldie for himself), traces of gold were found. The samples were sent back to Sydney for analysis in 1878, the find stimulating a gold rush to New Guinea. In the next few years, Goldie made several more trips to New Guinea. Fever and hardship led him to settle near Haunabada in 1878 and set up a trading store on land purchased.

Described as an "abstemious, hard-working man (Moore 2003)," Goldie collected more than 1,000 skins of over 120 species, as well as

other zoological and botanical specimens. He travelled widely along the southeast coast, more so than any other European of his time, and enjoyed good interactions with the villagers, often taking only his dog for protection. His relations with other workers were quite different, however. His dealings with specimens as a commercial enterprise contributed to his unpopularity among the scientific community. He guarded his reputation as an explorer quite jealously, denying those who worked for him the opportunity to publish their findings independently. While it is true that Goldie was a knowledgeable and efficient field collector, it has been suggested that some discoveries that he asserted to have made were actually the output of Carl von Hunstein, a German naturalist who sometimes worked with him and discovered more new species of birds of paradise than any other worker. Goldie died in Port Moresby in 1891. Several birds carry his name: Goldie's Bird of Paradise (*Paradisaea decora*) (Salvin and Godwin 1883), Goldie's Lorikeet (*Trichoglossus goldiei*=*Psitteuteles goldei*) (Sharpe 1882), Jungle Hawk-Owl (*Ninox goldii* = *N. theomacha goldii*) (Gurney 1883), Painted Quail-thrush (*Eupetes goldiei* = *Cinclosoma ajax goldiei*) (Ramsay 1879a), and Brown Cuckoo-Dove (*Macropygia goldiei* = *M. a. cinereiceps*) (Salvadori 1893). See Gibbney (1972) for more information on Goldie.

Alexander Morton (ca. 1855-1907) (Figure 7) was born at Hardtimes Landing, Louisiana, United States, and moved to Queensland when a boy. The Museum appointed him as a collector in 1877 to assist Goldie in New Guinea. During fieldwork in the Northern Territory in 1878, Morton collected around Port Darwin and Port Essington. Two years later, he was engaged as Assistant Taxidermist and the year after that (1881) spent several months collecting in the Solomon Islands. Following trips in 1882 to Lord Howe Island and the Burdekin River, Queensland, Morton was appointed in early 1883 as Assistant to the Curator. The next year, however, he submitted his resignation, having been hired as the Director of the Royal Society of Tasmania's museum (now the Tasmanian Museum and Art Gallery), Hobart. Morton later also became the Director of the botanic gardens (1904), Honorary Secretary of the Royal Society of Tasmania (1897-1907), and Honorary Curator of the Queen Victoria Museum and Art Gallery, Launceston (1891-1896), which he helped establish. He was also a Fellow of the Linnean Society of London. North named the



Figure 7. Alexander Morton (left), Curator's Assistant and collector, 1877-1884; portrait taken, ca. 1904, during his tenure as Director of the Tasmanian Museum and Art Gallery, Hobart. Photograph by J. W. Beattie; courtesy Tasmanian Museum and Art Gallery, TMAG Q12056. Kendall Broadbent (right), collector, 1877-1879, while employed at the Queensland Museum subsequent to his work for the Australian Museum. Courtesy Queensland Museum QM NP993.

sittella *Neositta mortoni* (= *Daphoenositta chrysoptera leucoptera / mortoni*) after Morton, who had collected the specimens in 1876. See Mercer (1986) for more on Morton.

Another collector in the Solomon Islands was William John Stephens (1829-1890), the first Headmaster of Sydney Grammar School and later (1882) new Chair of Natural History at the University of Sydney and holder of the W. H. Hovell Lectureship in Geology and Physical Geography. From his arrival in Australia, Stephens played a prominent role in the founding of several scientific societies: the Philosophical (later Royal) Society of New South Wales, Linnean Society of New South Wales, Zoological Society of New South Wales,

New South Wales branch of the Geographical Society of Australasia, and Entomological Society of New South Wales. From 1862 onwards, he was an elective Trustee of the Museum and also was deeply involved in the development of the Macleay Museum (Fulton, this volume). He collected on Ugi and San Christobal (=Makira) in 1882, providing the Museum with 280 specimens. Turney (1976) gives a history of Stephens.

Kendall Broadbent (1837-1891) (Figure 7) moved as a boy with his family from England to Victoria in 1853. In 1858, he collected what would be the type specimen of the Rufous Bristlebird, named 12 years later as *Dasyornis broadbenti* in his honour (see Longmore, this volume). Broadbent collected widely in Australia, eventually visiting every state for his various employers, and made several trips to New Guinea. In January 1872, Broadbent joined the ill-fated New Guinea Prospecting Association's planned trip. While travelling up the Queensland coast to New Guinea in the brig *Maria*, the unseaworthy vessel began to take water. They hit and were wrecked on Bramble Reef, off Hinchinbrook Island. The captain and a few chosen friends abandoned the ship in the lifeboat, leaving the others to their fate. Broadbent survived, but over half those aboard perished, drowned, were taken by sharks, or killed by Aborigines where they made it ashore. He was part of a party lead by Octavius Stone working around Port Moresby (1875-1876). During this trip, he contracted a severe fever, the effects of which remained with him for the rest of his life. In 1877, Broadbent commenced collecting birds for Ramsay and continued until 1879.

Broadbent collected a new form of the Double-eyed Fig-Parrot (*Cyclopsitta diophthalma*) near Cardwell, Queensland, in 1874. When he returned to Brisbane, he delivered the specimens to Eli Waller, the former Museum taxidermist then living there. Broadbent and Waller brought this new find to the attention of John Gould in England, Frederick McCoy, the Director of the museum in Melbourne (now Museum Victoria), and Ramsay at the Australian Museum. In a covering letter to Gould, Broadbent requested that it be named after Waller, whereas Waller in his own letter asked that it be named after McCoy. Gould, McCoy, and Ramsay in quick succession each published a new name for this undescribed bird, apparently without any knowing of the others' intentions. McCoy used *leadbeateri* (McCoy 1875), for an assistant in his museum; Gould proposed *maccoyi*, after

McCoy (Gould 1875); and Ramsay called it *macleayana* after his friend, William John Macleay (Ramsay 1874b, 1875). A painting of this bird, possibly done by Waller, was sent to Gould with the label *Cyclopsitta walleri*, but this name was never formally published (Mathews 1930). Although initially published in the newspaper *Sydney Morning Herald*, Ramsay's name, having priority, is now that in use. This series of events was summarised by Chisholm (1929).

After leaving the Australian Museum, Broadbent was appointed taxidermist at the Queensland Museum in 1881. He continued in this role until 1893, and then stayed on as an attendant until 1900. Broadbent not only acquired birds: he obtained a range of animals, fossils, and anthropological material. He was described in his obituary as a "thorough field naturalist and a most discerning zoological collector" (McCarthy 2010) and was considered an authority on the Australian avifauna. Broadbent's obituary appeared in *Emu* (Anonymous 1911).

After parting company with James F. Cockerell upon their return from Somerset and the Aru Islands in 1868, John Adolphus Thorpe (?-1907) moved to Sydney. He was appointed as taxidermist at the Museum, a position he held until his death in 1907. During this time, working by himself or in the field with North or others, he collected several thousand specimens. After his death, a small personal collection was acquired by the Museum.

Thorpe's replacement was Robert Grant (ca.1845-1923), a Scotsman. Although Grant was a coal miner as a boy, his interests and abilities in natural history were soon recognised and he became a gamekeeper at age 18. The local landowners allowed him access to their estates to pursue his interests. With his father, Henry, he migrated to Australia in 1886, where he again took up coal mining. Here his skills with taxidermy were again noticed, this time by Ramsay. Initially engaging Grant to collect locally, Ramsay later obtained approval for him, accompanied by his wife and another fieldworker, Edward James Cairn, to collect on the Atherton Tableland in 1887. From Cairns, on horseback, with eight pack horses to carry their gear, the party headed inland, initially to Boar Pocket at Mt. Bellenden Ker. At one point, Mrs Grant's dress was caught in a tree, pulling her from her saddle and leaving her dangling over a cliff, but keeping her from falling. Good relations with the local Aborigines assisted in the acquisition of many new species of birds and mammals.

An unexpected "acquisition" was an infant Aboriginal boy whose parents had been recently killed. The party rescued him, with Grant taking him back to Lithgow, raising him with his own son and eventually adopting him. Douglas, as he was named, became a skilled artist and draughtsman, taxidermist, and bagpipe player, with a broad knowledge of poetry and Shakespeare, and spoke with a Scottish accent. He joined the army, fighting in France before becoming a prisoner of war; he returned to Australia in 1919. Coultard-Clark (1983) presents further information on Douglas Grant (1885?-1951).

In 1888, Grant and Cairn, accompanied by a reporter from the *Sydney Morning Herald*, began a collecting trip from Bourke, NSW, along the Darling River, headed for South Australia. Unfortunately, after 500 km, it was found that drought had made the river unnavigable and they had to turn back. The party returned to Bourke on foot and spent the next three months collecting in that general vicinity. In 1889, Grant, his wife and Cairn were again sent to the Atherton Tableland, mainly Mount Bartle Frere. Bad weather hampered the productivity of the trip. Grant, often accompanied by his wife, made subsequent trips to parts of coastal and inland New South Wales, before eventually being moved to the Museum to replace Thorpe in 1907.

His son, Henry Sneddon Grant, who had also gained preparatory skills, joined the Museum in 1909, where he worked until 1942, eventually becoming Senior Taxidermist. Father and son worked together in the field on occasion. A. F. B. Hull (1916a) named the subspecies *Neonectris tenuirostris grantianus* (= Short-tailed Shearwater *Ardenna tenuirostris*) for them "both of whom frequently accompanied me on my island trips, and prepared the skins of all specimens taken (Hull 1916a, p. 205).

While preparing a series of recently acquired *Paradisaea* birds of paradise for a mounted display, Robert Grant recognised that one looked different from the others. He brought this to the attention of North, who subsequently named the bird in Grant's honour (*Paradisaea granti* = *P. raggiana granti*, a subspecies of Raggiana's Bird of Paradise) (North 1906a). Grant retired in 1917 because of bad health. In addition to specimens collected for the Museum, Grant had a private collection of skins. These were purchased by a syndicate in 1916 and donated to the Museum. The specimens are well prepared, but have little documentation beyond locality and date. In many instances, there are questions about the validity of the information on the labels, it

having been insinuated that they had been written by Grant or his son Henry at home, well after the specimens were collected. Questions about the reliability of the specimen data require that the use of these skins be done with caution.

In 1944, H. S. Grant's skeleton was found in a cave in Glenbrook, NSW. His diary, found nearby, had the entry, "For the past two years life has been a tragedy for me. A doctor gave me a series of injections which collapsed my brains. Death would be preferable to this world. Good-bye to this tragic world. I have had nothing to eat for five days (*Canberra Times*, 12 January 1944, p. 3)." On the basis of this, it was ruled that Grant had died of starvation, while mentally deranged.

Alfred J. North (1855–1917).—Ramsay's most productive collaboration was with Alfred John North (Figure 8). Initially a jeweller by trade, North had a long standing interest in natural history. Starting as a schoolboy in Victoria, he collected eggs from many parts of the state, gradually building a substantial holding. This interest led him to correspond with E. P. Ramsay and later they began to exchange eggs. Ramsay subsequently hired North in September 1886 to curate his private collection of eggs and skins (Dobroyde Collection). In December of the same year, North was employed at the Australian Museum as a cataloguer to assist Ramsay in producing catalogues of the collections. Four volumes were published (Ramsay 1876h, 1890b, 1891, 1894).

Another project was to assist in arranging the Museum's egg collection. This led to the publication of *Descriptive Catalogue of Nests and Eggs* (North 1890). The following year, North was appointed as Assistant Curator of Ornithology, a position he held until his death.

Walter Baldwin Spencer (1860–1929) invited North to work on the birds recorded and collected by the Horn Expedition (May–August 1894) to central Australia. When the report was published, it included North's text and descriptions (North 1896a), together with the field notes of George Kearland, an amateur who had been part of the trip. Kearland continued to provide North with observations and specimens, and North named after him a new honeyeater that had been obtained on the Expedition, *Lichenostomus keartlandi* (North 1895).

Seeing large numbers of skins and feathers of Regent Bowerbird (*Sericulus chrysocephalus*), Paradise Riflebird (*Ptiloris paradiseus*),



Figure 8. Alfred John North, initially employed by E. P. Ramsay to curate his personal collection, before joining the Australian Museum, first as Cataloguer and then as Assistant Curator, until his death, 1886-1917. Courtesy Australian Museum Archives AMS391 M01901-1.

and Superb Lyrebird (*Menura superba*) for sale in shops led him to write on conservation and the threat of extinction of these and other species. North's comments aided the revision of the Bird Protection Act (1901) in 1905 granting these species complete protection. He produced a paper on birds useful to agriculture, which he published in the *Agricultural Gazette of New South Wales* (North 1896b).

North published extensively, most of it on descriptions of new taxa and eggs. His most important work was his four volume *Nests and Eggs of Birds Found Breeding in Australia and Tasmania* (North 1901–1914). Intended as a revision of his earlier descriptive catalogue, the accounts were completely rewritten and expanded. While gathering information of this publication, North received eggs and field notes from a range of professional and amateur ornithologists from around the country, supplemented by his own fieldwork. The text was accompanied by high quality photographs of nests, taken by North himself and Museum photographer Henry Barnes. Black-and-white drawings were provided by Neville Henry Pennington Cayley, the father of Neville Cayley, author of the well known Australian identification guide, *What Bird is That?* (Cayley 1931). In a handful of copies, he also hand painted the egg plates.

The first volume appeared in four parts between 1901 and 1904 (North 1901–1904) to strong critical acclaim. This was followed by three subsequent volumes, Volume II (3 parts) (North 1906–1909), Volume III (five parts) (North 1911–1912), and Volume IV (five parts) (North 1913–1914). *Nests and Eggs* was a landmark publication at the time and remains an important reference.

The main criticism against this work was North's omission of any reference to the work by certain authors and any mention of taxa described by them. Mathews (1925, p. 100) remarked "This work is of inestimable value, but shows one unfortunate feature, the neglect of contemporary records, because North did not like the recorder." North gained the reputation of being intolerant of amateurs and refusing to interact with them, whether providing them with information or accepting their records. It is true that there are several notable cases in which he had an obvious disregard for certain individuals, but Cahill (1998) has made a strong case that North's actions have been misinterpreted. A quick perusal of *Nests and Eggs* demonstrates that North had ongoing and successful communications with a number of

amateurs who provided him with eggs and field notes throughout the production of these volumes.

Some writers attributed North's apparently ill-tempered behaviour to persistent bad health. While he had increasing ailments, he was still able to carry out fieldwork, so this factor seems over emphasised. Cahill (1998) attributed North's reputed attitude towards amateurs to his fierce commitment to standards of accuracy. This led him to reject identifications of eggs where he considered that the validity was questionable and to ignore those individuals who provided the identifications. In particular, he regarded as questionable a number of records by William Henry Dudley Le Souëf (1857-1923) and Sydney William Jackson (1873-1946).

Jackson was an early correspondent with North, offering eggs and information, but gradually North began to doubt the accuracy of what he received, and eventually broke off any interaction with him. The relationship was not helped by Jackson's quest for attention and practice of selling eggs, which North viewed unfavourably. According to Cahill (1998), the severing of this relationship contributed to the schism between North and Archibald James Campbell (1853-1929) of Melbourne. Campbell also had a strong interest in eggs, having described a number for the first time, and was also producing a similar volume to *Nests and Eggs*. Unlike North, Campbell accepted uncritically the information supplied by Jackson and Le Souëf. North, in turn, extended the attitude he held for those collectors to Campbell's work, disregarding it totally, including his descriptions of new eggs. An unfortunate consequence of this is that *Nests and Eggs* omitted several species that were certainly valid, and thus the taxonomic coverage remained incomplete.

Even more regrettable is the deterioration of relations between North and Henry Luke White (1860-1927), a rich amateur from Belltrees, New South Wales. White amassed Australia's largest private collection of skins and eggs by buying specimens and hiring collectors. North apparently tired of White's ongoing requests for assistance, while White grew increasingly upset at being ignored. The situation was no doubt exacerbated when Sydney Jackson sold his collection to White, and was hired to curate White's collection. Although White had previously considered donating his vast collection to the Australian Museum, his insult at North's slights caused him to give the collection to the National Museum of Victoria and, further, specify that it could

not be lent or otherwise leave the institution, thus denying North the opportunity to examine the specimens himself. See Longmore (this volume) for further details of this situation.

North never joined the Royal Australasian Ornithologists' Union (RAOU), launched in 1901, probably because it was based in Victoria and Campbell was a leading figure among its members. He published little of his work in the *Emu*, preferring journals based in his state, particularly *Records of the Australian Museum* and *Proceedings of the Linnean Society of New South Wales*, with the exception of the *Victorian Naturalist*. The last was the journal of the Field Naturalists' Club of Victoria, of which he had been a founding member as a youth. North also became a Corresponding Member of the American Ornithologists' Union and a Colonial Member of the British Ornithologists' Union.

In honour of North, Gregory Macalister Mathews (1876-1949) named several genera, species, and subspecies after him. Only the generic name for the Bluebonnet (*Northiella*) remains valid (Mathews 1912a). North described seven Australian species: Western Ground Parrot (*Pezoporus flaviventris*) (North 1911-1912), White-browed Treecreeper (*Climacteris affinis*) (North 1895), Thick-billed Grasswren (*Amytornis modestus*) (North 1902a), Grey-headed Honeyeater (*Lichenostomus keartlandi*) (North 1895), Banded Whiteface (*Aphelocephala nigricincta*) (North 1895), Little Crow (*Corvus bennettii*) (North 1901a), and Spinifexbird (*Eremiornis carteri*) (North 1900a). In addition, he named four Pacific island species (North 1906a, 1908), 15 currently accepted subspecies, and 13 of what are now specific and subspecific synonyms (North 1893, 1895, 1896a, 1897a,b, 1899, 1900b, 1901b,c, 1901-1904, 1902a,b, 1904a,b,c, 1905a,b, 1906a,c, 1907, 1909a,b, 1912, 1916).

Many of these were named after other ornithologists who had assisted him: other museum workers, E. P. Ramsay (*Azure Kingfisher* *Alcyone ramsayi* = *Ceyx azurea ramsayi*) (North 1912), Robert Grant (*Paradisaea granti* = *Paradisaea raggiana granti*) (North 1906a), George Masters (Western Thornbill *Acanthiza mastersi* = *Acanthiza inornata mastersi*) (North 1901b), and Alex Morton (Varied Sittella *Neositta mortoni* = *Daphoenositta c. l. / mortoni*) (North 1912), and the amateur collectors Thomas Carter (1863-1931) (*Eremiornis carteri*) (North 1900a), George Kearnland from the Horn Expedition (Grey-headed Honeyeater *Lichenostomus keartlandi*) (North 1895), Alexander

Sykes Macgillivray (1853-1907) (Cloncurry Ringneck *Platycercus macgillivrayi* = *Barnardius zonarius macgillivrayi*) (North 1900b), Henry Greensill (Harry) Barnard (1869-1966) (Yellow Wagtail *Motacilla barnardi* = *Motacilla flava simillima*) (North 1905a), and Frederic B. L. Whitlock (1860-1953) (Inland Thornbill *Acanthiza whitlocki* = *A. apicalis whitlocki*) (North 1909a). For Alfred Ernest Stephen (1870-1961), an Australian metallurgist chemist, who collected specimens on Henderson Island, North named the Henderson Lory (*Calliptilus stepheni* = *Vini stepheni*) (North 1908). *Corvus bennetti* (North 1901a) is tribute to Kenric Harold Bennett (? -1891), who provided important and rare specimens, including the type of this species, and notes to North from the Hay Plain region during the 1860s. Although he published little, he wrote many notes, including those documenting the effect on the area of introduced Rabbits (*Oryctolagus cuniculus*), which arrived in the area while he was there (I. A. W. McAllan, pers. comm).

In 1912, North formally incorporated the Dobroyde Collection into the Museum's holdings, after an extensive delay, it having been purchased in 1898. He also donated to the Museum his own egg collection of over 1,400 clutches. North died at his home in 1917 while still employed. His obituary appeared in *Emu* (Anonymous 1917b) and an appreciation was published by Mathews (1918). The best account of North the ornithologist is that of Cahill (1998).

QUIETER TIMES

A. F. Bassett Hull (1862-1945).—Following North's death, the Director Robert Etheridge, Jr, decided not to fill the position of ornithologist—on the grounds that enough was already known on the subject of Australian birds and any new appointment to the role would have a far too undemanding job. Instead, the Museum appointed Arthur Francis Bassett Hull (Figure 9)—who had suggested the position and then graciously volunteered to fill it—as Honorary Ornithologist in 1917, a role he held until 1945. Hull was a keen amateur naturalist with strong interests in conchology and ornithology. He served a term as President of the Royal Australasian Ornithologists' Union (1919-1920) and was a Corresponding Fellow of the American Ornithologists' Union

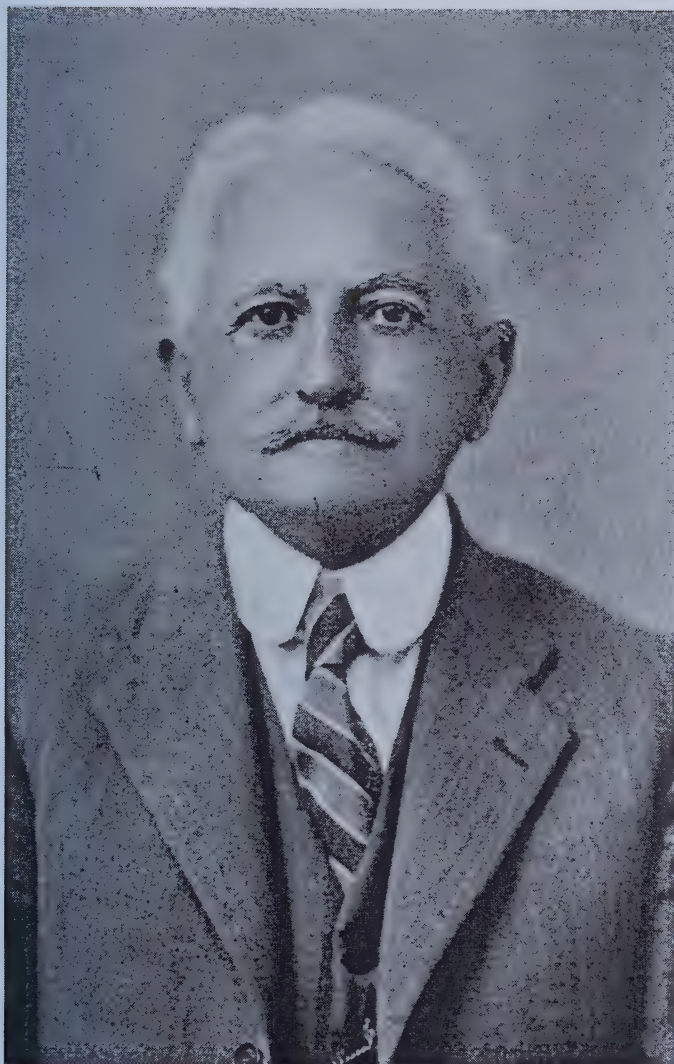


Figure 9. Arthur Francis Bassett Hull, Honorary Ornithologist following the death of A. J. North, 1917-1945. Courtesy Royal Zoological Society of New South Wales.

and Corresponding Member of the Academy of Natural Sciences, Philadelphia. In 1936, he was made a Member of the British Empire.

Hull published on seabirds and coastal birds of New South Wales (Hull 1908, 1911a,b, 1912, 1916a,b), his most important ornithological publication being *Birds of Lord Howe and Norfolk Islands* (Hull 1909). Hull was an active oologist and discovered the until then unknown nesting place and eggs of Gould's Petrel (*Pterodroma leucoptera*) (Hull 1911c,d). His collection of 800 eggs was acquired by the Museum after it was confiscated during the 1930s (see below). His name is commemorated in the Lord Howe Island subspecies of Flesh-footed Shearwater (*Puffinus carneipes hullianus*) (Mathews 1912b) and Tasman Starling (*Aplornis fuscus hullianus*) (Mathews 1912a), as well as some molluscs, including the chiton genus *Bassethullia* (Pilsbry 1928). See Hindwood (1945a) and Kloot (1983a) for more information.

J. Roy Kinghorn (1891–1983).—James Roy Kinghorn (Figure 10) joined the Museum in 1907 as a cadet under a newly created program that involved assisting with curation—in his case, mainly of crustaceans—while attending classes at the University of Sydney and Sydney Technical College. Regrettably, he failed his college examination and his position at the Museum was downgraded to “zoologist's clerk for the spirit collection” (Strahan 1979). Kinghorn left the Museum in 1914 to take up a position on the Commonwealth Fisheries' investigation ship *Endeavour*. Fortunately, he was not aboard when the vessel was lost at sea. The following year, he enlisted in the military, serving in Egypt and on the Western Front before an injury saw him discharged and returned to Australia in 1918. Kinghorn rejoined the Museum that year, as Curator for Amphibians and Reptiles, and later (1921) was given the additional responsibility of overseeing the ornithology section and collections. In 1941, he was given the further role of Assistant to the Director. During World War II, he was a member of the Volunteer Defence Corps, during which time he lectured soldiers on camouflage techniques. Kinghorn was a noted communicator of science: he wrote natural history articles for newspapers and popular magazines, particularly the *Australian Museum Magazine* (e.g., Kinghorn 1936, 1944, 1951), gave regular public lectures at the Museum and elsewhere in the state, and, following his retirement in 1956, worked on children's television shows for commercial channels and became a broadcaster on natural history



Figure 10. J. Roy Kinghorn (left), Curator of Reptiles and Amphibians from 1918 to which was added Birds in 1921 until his retirement 1956, and William (Billy) Barnes, preparator, 1907-1949, in front of wooden cabinets then used for the storage of bird specimens; photograph taken 1933. Courtesy Australian Museum Archives AMS514 VA180-5.

topics for Australian Broadcasting Corporation Radio and Television. One internet reference lists one of his occupations at this time as “radio entertainer.” Kinghorn was a corresponding member of the Zoological Society of London and a fellow of the California Academy of Sciences, and he served several terms as president of the Royal Zoological Society of New South Wales (1927-1928, 1950-1956). More on Kinghorn is given by Docker (2007).

Kinghorn did not publish extensively on birds—he was better known for his herpetological work, including *Snakes of Australia* (Kinghorn 1929a)—but did produce a number of smaller papers focusing on Australia (e.g., Kinghorn and Fletcher 1927) and one large

one on the Pacific islands (Kinghorn 1937). Much of his Australian work dealt with bird protection (Kinghorn 1924, 1929b), introduced species (Kinghorn 1926a, 1931, 1933), and the economic impacts of native species (Kinghorn 1924, 1926b). Kinghorn named a subspecies of Mackinlay's Cuckoo-Dove *Macropygia rufa trougtoni* (= *Macropygia mackinlayi trougtoni*) (Kinghorn 1937), the Rennell Island form of the Brown Goshawk *Urospiza fasciata rennelliana* (= *Accipiter fasciatus fasciatus*) (Kinghorn 1937), and bird of paradise *Taeniaparadisea macnicolli* (= *Astrapia mayeri*) (Kinghorn 1939). His name appears as collector on less than 200 specimens during this time, but there were many more obtained by other Museum staff during fieldwork in Australia and New Guinea in this period.

During Ramsay's period, most workers may have concentrated on particular animal groups, but any were competent with the collection and preservation of a wider range of taxa. This was obvious at the Museum, where non-ornithological staff added significantly to the growth of the bird collection well into the 20th century. On a trip to Lord Howe Island (1887), Robert Etheridge, Jr., palaeontologist and later Director, procured many bird specimens while studying the island's geology and general zoology. A few years later, Edgar R. Waite and Allan McCulloch, ichthyologists, similarly acquired a range of birds while on the island.

Harold Oswald Fletcher (1903-1996) was the Museum's Curator of Marine Invertebrates, but joined the British, Australian and New Zealand Antarctic Research Expedition, led by Douglas Mawson, in 1929 as assistant biologist to study marine life, but also served as taxidermist; bird specimens from this trip are now in the Museum. He wrote a narrative of his time on the expedition (Fletcher 1984).

Ellis Le Geyt Troughton (1893-1974) began at the Museum as a cadet in 1908 at the age of 14, but subsequently became Curator of Mammals. He collected birds on many of his field trips, often with other Museum staff: cadet preparator J. H. Wright in South Australia and Western Australia (1921), ichthyologist Arthur A. Livingstone in the islands of Santa Cruz (1926), H. O. Fletcher in Queensland and Northern Territory (1934), and on trips to Lord Howe Island. Together with cadet preparator N. J. E. Camps, he amassed an important collection of 210 New Guinea birds in 1954.



Figure 11. Tom Iredale, Curator of Molluscs 1924-1944, with his wife, artist Lillian Medland, and children, Rex and Beryl, ca. 1920? Source National Library of Australia, G. M. Mathews collection of portraits of ornithologists, nla.pic-vn3586458.

Tom Iredale (1880–1972).—One non-ornithologist on staff stands out from all others as for his involvement with birds. Tom Iredale (Figure 11) left England in 1902 with no formal training or high school matriculation, and sailed to New Zealand. He had an interest in birds and developed one in molluscs, this giving him the opportunity to take part in a trip to the Kermadec Islands for malacological fieldwork. During a stopover in Sydney before returning to England he met the Museum's conchologist, Charles Hedley (1862-1926), and subsequently donated specimens from various countries to the Museum. It was during a time working at the British Museum identifying Kermadec birds, later published in several papers (Iredale 1910, 1913a, 1914a,b), that he met Gregory Mathews. Mathews had just started producing his monumental series, *The Birds of Australia* (Mathews 1910-1927), and hired Iredale as his secretary, a role he

maintained from 1909 to 1923. He was deeply involved in the preparation of Mathews' other publications during that time as well, co-authoring some, including the only volume of *A Manual of Birds of Australia* (Mathews and Iredale 1921). It was also during this period that Iredale developed his strong interest in systematics and nomenclature. He was a member of the British Ornithologist's Union's committee on nomenclature for four years. From working with Mathews Iredale developed a similar interest in small nomenclatural matters, (e.g., Mathews and Iredale 1917, 1918, Iredale and Mathews 1926, Iredale 1938) and in obscure or poorly known historical aspects of old publications or workers (e.g., Iredale 1913, 1925, Mathews and Iredale 1913, 1915, 1920). The vehicle for many of these papers was Mathews' personal journal, *Austral Avian Record*. In it, Mathews and Iredale introduced a host of new names on often trivial grounds.

When he returned to Australia in 1923, Iredale renewed his acquaintance with Hedley, working with him on molluscs. The ornithology position at the Museum was then occupied by Roy Kinghorn, so when Hedley resigned, Iredale was appointed as malacologist. He held this position until his retirement in 1944.

During his career, he published over 360 scientific and popular papers and articles, and introduced hundreds of new names, most of them of molluscs. He and Hull collaborated on extensive revisions of the loricates. More than 120 of Iredale's publications were ornithologically-related (see list in Whitley 1972). In one of his foremost publications, the two volume *Birds of New Guinea* (Iredale 1956), illustrated by his wife, Lillian Medland (Figure 11), Iredale erected a number of new generic names. This is an unfortunate example of Mathewsian-inspired oversplitting, although recent molecular studies have validated two of these: the honeyeater *Caligavis* (formerly *Meliphaga* then *Lichenostomus*) and the pachycephalid *Aleadryas* (formerly *Pachycephala*). A planned book on kingfishers was under way at the time of his death; Medland had already completed the plates.

Iredale had a particular interest in birds of paradise. He published a systematic list of these birds (Iredale 1948), which was followed in 1950 by the book *Birds of Paradise and Bowerbirds* (Iredale 1950), also illustrated by Medland. He had been greatly influenced by Mathews' peculiar approach to nomenclature, and this was reflected in the names adopted in the text. "Both his list and book are idiosyncratic

in content, quite aside from the oddly individualistic classification he used" (Frith and Frith 2010, p. 144).

He also did not accept that extensive hybridisation occurred between species of birds of paradise, regarding each combination as a legitimate species, and railing against those workers who believed otherwise. Some of these hybrids Iredale applied names to himself. One was Blood's Bird of Paradise (*Paradisaea bloodi*) (Iredale 1948), a cross between the Blue Bird of Paradise (*P. rudolphi*) and Raggiana's Bird of Paradise (*P. raggiana*) (Frith and Frith 1910). The unique specimen had been obtained by Captain Neptune (Ned) B. Blood, who was managing the joint aviaries and sheep station established by Sir Edward Hallstrom in the Western Highlands Province of Papua New Guinea. Another hybrid named by Iredale was Barnes' Astrapia or Barnes's Long-tail (*Astrarchia barnesi*, a hybrid between Ribbon-tailed Astrapia (*Astrapia mayeri*) and Stephanie's Astrapia (*A. stephaniae ducalis*) (Iredale 1948). William (Billy) Barnes, for whom it was named, was a taxidermist at the Museum from 1907 to 1948 (Figure 10). He provided Iredale with specimens of birds of paradise during the writing of the book. His friendship with Ned Blood was instrumental in the acquisition by the Museum of specimens from remote parts of New Guinea. William Barnes was no relation to earlier Museum taxidermists of this last name.

Other new taxa named by Iredale include the Cape York subspecies of the Double-eyed Fig-Parrot (*Opopsitta marshalli* = *Cyclopsitta diophthalma marshalli*), after A.J. Marshall (Iredale 1946), *Cnemophilus macgregorii sanguineus* (Iredale 1948), and the birds of paradise *Diphyllodes magnifica extra* (Iredale 1950), *Lophorina superba addenda* (= *Lophorina superba feminina*) (Iredale 1948), and *Parotia lawesii exhibita* (Iredale 1948).

Mathews named several birds for Iredale. Most, like the robin *Iredaleornis* (= *Heteromyias*) (Mathews 1912c), have been synonymised, but two valid names are in use, the jacana genus *Irediparra* (Mathews 1911a) and Samphire Thornbill (*Acanthiza iredalei*) (Mathews 1911b). (Mathews also recognised Iredale's colleague at the Museum, Charles Hedley, with what is now recognised as the subspecies *Acanthiza iredalei hedleyi* (Mathews 1912d)).

A. J. (Jock) Marshall (1911–1967).—Iredale enthusiastically gave his time to those beginning in the natural history field, going on to help

inspire a number to careers in the field. One of the most notable of these was Alan John (Jock) Marshall (Figure 12). Marshall was expelled from



Figure 12. Alan John (Jock) Marshall, appointed as Honorary Fellow of the Australian Museum in 1934; photograph taken 1937. Source National Library of Australia, G. M. Mathews collection of portraits of ornithologists, nla.pic-vn3793302.

high school for acting up and then, when 15, lost his left arm in an accident with a shotgun. His mother, despairing on what to do with her son, recognised his strong interest in natural history and contacted the ornithologist Neville Cayley for advice. He, in turn, asked the prominent naturalist Alec Chisholm, who took Marshall under his wing, introducing him to scientists at the Museum, including Iredale and the mammalogist Ellis Troughton.

Through these contacts, Marshall had the opportunity for fieldwork and gaining new skills. The loss of his arm did not deter him. He learnt to collect, dissect, and prepare specimens, using "pins where another would have used fingers" (Marshall 1998) and small hooks on hanging chains (H. J. Disney, pers. comm.). Marshall also continued to shoot, using a special sawn off shotgun to make its use easier. On one occasion, this got him thrown in jail until he explained, and the Museum vouched, that he was collecting specimens for scientific purpose.

His first publications were short notes on single species, such as the Yellow-throated Scrubwren (*Sericornis citreogularis*) (Marshall 1930) and Azure Kingfisher (*Ceyx azurea*) (Marshall 1931). Soon he extended his papers to lists of birds seen during his fieldwork (Marshall 1934a,b, 1935). Marshall's big break came one day while at the Museum when he was introduced to a visitor, J. R. Baker, who was leading an expedition from Oxford University to Espiritu Santo, New Hebrides (Vanuatu). Baker was interested in the relationship between the equatorial location and breeding seasons in the birds. Upon Iredale's recommendation, Marshall was invited to join the expedition, which he did in early 1934, remaining an extra seven months, joining another young fieldworker, Thomas Harrisson. They co-authored a work on the birds on the island (Marshall and Harrisson 1941) and, while in the New Hebrides, Marshall and Harrisson obtained the first specimens of the Mountain Starling (*Aplornis santovestris*), which they described (Harrisson and Marshall 1937). Together with Baker, Marshall wrote on the other findings from the trip (Marshall and Baker 1940).

Another trip for Oxford was seven months in the Mandated Territory of New Guinea and Dutch New Guinea (Irian Jaya [now West Papua]) (1936). There he taught the local women to skin birds and found that they excelled at this. "Oh why didn't I think of this in the New Hebrides?!" (Marshall 1998). This gave Marshall considerable

time to write and he was able to finish his writing on the New Hebridean birds.

Marshall was allowed to enroll as an unmatriculated student at the University of Sydney, gaining his BSc in 1940. Despite missing one arm, he joined the military, eventually leading a patrol, known as "Jockforce," into enemy territory in parts of New Guinea with which he was familiar (1945). After the war, he entered the University of Oxford, receiving a D.Phil. in 1949. The same year he was appointed to the staff of Saint Bartholomew's Hospital Medical College, University of London.

Marshall held this position for ten years, during which he began research on the breeding cycles and reproductive physiology of birds, including the influence of factors such as weather, migration, and food (e.g., Marshall 1949a,b, 1951a,b, 1952a, 1959). Many of his investigations took place in England, but also took him to the Arctic (Marshall 1952b, Marshall and Williams 1959), east Africa (Marshall and Disney 1957) and Australia (Marshall and Serventy 1958). In 1951, during visits to Australia, he began joint projects with Dominic Lewis Serventy (1904-1988) of the Commonwealth Scientific, Industry and Research Organisation (CSIRO) in Western Australia. Serventy was a seabird specialist and together they studied aspects of the life history of the Short-tailed Shearwater (*Puffinus tenuirostris*) (Marshall and Serventy 1956a,b, 1958, 1959).

From one of his first notes on the Satin Bowerbird (*Ptilonorhynchus violaceus*) (Marshall 1931b), he had an interest in bowerbirds. His publications on these birds include papers on the displays and sexual cycles in several species (Marshall 1951c, 1952c, 1954a), a large review of the family (Marshall 1954b), and a book, *Bower Birds* (Marshall 1954c). Marshall also reviewed vocal mimicry, which is so prominent among Australian songbirds (Marshall 1950), and the status of the Blue-faced Parrot-Finch (*Erythrura trichroa*) in Australia (1948).

In 1956, he was awarded a D.Sc. from Oxford, and in the next few years, also had a visiting lectureship at Yale University, New Haven, Connecticut (1958), and the University of California (1959). Marshall returned to Australia in 1959 as the Foundation Chair of Biology (later Zoology and Comparative Physiology) at Monash University, Melbourne, where he was later appointed Dean of the faculty of science in 1961.

He published more than 80 papers in scientific journals and several books, and edited the important ornithological work, the two volume *Biology and Comparative Physiology of Birds* (Marshall 1960-1961). Among his popular books, perhaps the best known is his collaboration with Russell Drysdale, *Journey Among Men* (Marshall and Drysdale 1962).

The Museum had appointed him as an Honorary Fellow in 1934 and the Royal Australasian Ornithologists' Union made him a fellow in 1958. The Cape York subspecies of the Double-eyed Fig-Parrot (*Cyclopsitta diophthalma marshalli*) was named by Iredale in Marshall's honour (Iredale 1946), based on specimens that Marshall himself had collected in 1942. There are only 200 specimens in the Museum that were collected by Marshall, but these represent major periods in his life: time in New Hebrides and New Guinea with Oxford University field teams, work in north Queensland, where he collected the fig-parrot that bears his name, in Spitsbergen, Norway studying Arctic birds, in Western Australia with Dom Serventy, and around the Sydney region. Marshall died from cancer in 1967 at age 56. More on his life and work appear in Warren (2000) and, particularly, Marshall (1998).

Keith A. Hindwood (1904–1971).—Keith Alfred Hindwood (Figure 13) was appointed as Honorary Ornithologist, and later Research Associate, at the Museum in 1930, a role he held for 40 years. Although he had no formal training, leaving school at 14 to set up a stationery and printing business, which he ran until he retired in 1970, he was an acknowledged world authority on the birds of Australia and particularly of New South Wales. Mayr (1963, p. 27), in his presidential address to the 13th International Ornithological Congress, said, "There is perhaps no other branch of biology, indeed of science as a whole, to which the amateur has made so many and such important contributions as ornithology," and then "mention[ed] . . . a few leaders," citing Hindwood by name.

Hindwood joined the Royal Australasian Ornithologists' Union in 1924, at age 20. He contributed some short articles to the journal *Emu* (Hindwood 1924, 1926a), then followed this quickly with a detailed and ground breaking life history study of Rock Warbler (*Origma solitaria*) (Hindwood 1926b), the first time such an extended study of a single Australian species had been published. Other notable such



Figure 13. Keith A. Hindwood, Honorary Ornithologist and later Research Associate from 1930 until his death in 1971. Courtesy Royal Zoological Society of New South Wales.

monographs were on the Mangrove Heron (*Butorides striatus*) (Hindwood 1933) and the Logrunner (*Orthonyx temminckii*) (Hindwood 1934). By the time of his death, Hindwood had become the

most prolific author in *Emu*, with 185 main articles and short notes, totalling about 600 pages, or greater than 4% of space since start of the journal. He went on to serve as President of the RAOU (1944-1946), become an elected Fellow (1951), and remained an influential figure in the organisation throughout his life, including involvement with the overhaul of the Union during the 1960s (Robin 2001). He was also part of the New South Wales contingent that walked out of the 1930 RAOU campout at Marlo, Victoria, following the indiscrete collection of a bird in camp by George Mack of the National Museum of Victoria (see Robin 2001, this volume; Longmore, this volume). Other positions Hindwood held were Corresponding Fellow, American Ornithologists' Union (1938), President (1939) and Fellow (1950) of the Royal Zoological Society of New South Wales, and life member of the Gould League of Bird Lovers of New South Wales (1931). In 1959, he was a recipient of the Australian Natural History Medallion.

Hindwood had several areas of interest, a major one being the natural history and behaviour birds of the Sydney region and elsewhere in the state. His publications of these aspects ranged from short notes on interesting observations, such as petal use in displays (Hindwood 1948), to birds of certain localities (e.g., Long Reef, Hindwood 1942; honeyeaters of Sydney, Hindwood 1944), and new records for New South Wales or Australia. Another topic was historical ornithology, particularly pioneer naturalists and early colonial artists. Two of his most important papers on these subjects dealt with the early Sydney bird paintings (Hindwood 1965a) and John Hunter, a naturalist and artist on the First Fleet (Hindwood 1965b). When Hindwood and his wife took their honeymoon on Lord Howe Island, the visit inspired him to research and publish an extensive review of the birds of the Island, past and present (Hindwood 1940). Although he had an interest in taxonomy, Hindwood did not make major contributions to this, one of the few being a revision with Ernst Mayr of the stripe-crowned group of pardalotes (*Pardalotus striatus*) (Hindwood and Mayr 1946).

To record his observations and other information that came his way, Hindwood kept extensive files on a highly diverse range of ornithological topics. These were frequently consulted by other workers, and Hindwood was happy to pass on his knowledge. After his death, his friend Ernest (Ern) Sydney Hoskin (1914-2009), maintained these as the Hindwood Bird Recording Service and added to it for another 30 years. These files are now in the possession of the Mitchell

Library, Sydney. Hoskin used them as a basis for revising and updating *The Birds of Sydney, County of Cumberland, New South Wales, 1770–1989* (Hoskin 1991).

It was this treasure trove of information and Hindwood's personal knowledge and generosity that made him a valuable asset to the Museum. He provided advice and assistance to several curators, from Kinghorn through Disney. A major contribution to the Museum was his compilation of its first type list of birds (Hindwood 1946). While working with the Museum's collection, he recognised that a mounted specimen of Upland Sandpiper (*Bartramia longicauda*), which was collected in 1848 and was Australia's first and only specimen, was the one lent to John Gould for illustration in *Birds of Australia* (Hindwood 1950). Hindwood also wrote on the Museum's 1896 skin of Eyrean Grasswren (*Amytornis goyderi*), at the time only the third known (Hindwood 1945b).

Hindwood authored or co-authored several books, including *The Waders of Sydney* (Hindwood and Hoskin 1955; republished from their paper Hindwood and Hoskin 1954), *The Birds of Sydney* (Hindwood and McGill 1958), and *A Portfolio of Australian Birds* (Hindwood 1968, illustrated by W. T. Cooper). A planned handbook of birds of New South Wales was underway but not completed at the time of his sudden death while bird-watching in Royal National Park, on 18 March 1971. Hindwood is commemorated in the name of the Eungella Honeyeater (*Bolemoreus hindwoodi*) (Longmore and Boles 1983). More information is given by Hoskin (1996) and Robin (2001), and in his obituaries (Disney 1971, McGill 1971).

NEW RESEARCH DIRECTIONS

J. Allen Keast (1922–2009).—James Allen Keast (Figure 14) started at the Museum in 1947 as one of the first recruits under a recently introduced cadet scheme. Under this program, he would be bonded financially to the Museum, working at the institution during the holidays and undertaking university study on a full-time basis during the academic year. At the completion of this study, he would be appointed as an Assistant Curator.

Keast's passion for the bush manifested itself at an early age. When six, he caught the train to bushland to spend the day exploring.



Figure 14. J. Allen Keast (centre, standing) joined the Australian Museum as a cadet in 1947 and later became Curator of Birds, Reptiles and Amphibians, 1955-1962, with Paddy Bourke, Arnold McGill, and other ornithologists discussing camera merits, Round Swamp. Photograph by Michael Sharland, 1952; courtesy Australian Museum Archives AMS268/3/185.

(His mother ensured that he got off at the right station by giving the guard a shilling to oversee the trip.) He collected eggs for a few years, hiking extensively and filling his notebook with observations, and photography. In order to transcribe his field notes, he trained to be a high speed shorthand writer and typist, skills that would assist in a subsequent period of his life. He joined the Royal Zoological Society of NSW at 16, making many contacts among the amateur ornithological

fraternity, and soon began regular visits with staff at the Museum, particularly Tom Iredale, and with honorary ornithologist Keith Hindwood (Keast 1995).

One of his first papers came after a survey of the Five Islands, off Port Kembla (Keast 1943); another was winter distribution of birds in the Tweed River system, undertaken during his annual leave after his first year of work (Keast 1944).

Keast joined the army at the age of 19. His shorthand and typing skills earned him a place working in the local command when a heart valve problem prevented him from being on the front line. While based in Newcastle, he managed to write a short paper on the Grey-tailed Tattler (*Tringa brevipes*) (Keast 1949) based on observations made during breaks in his Army training. In time, he was stationed in New Britain. Although he was not always permitted to reveal in correspondence where he was located, he listed down to subspecies level the birds he observed. His astute ornithological colleagues could then work out rather closely where he was stationed.

Upon his return to Australia, Keast studied at the University of Sydney from 1946 to 1950, graduating with a B.Sc with first class honours. Because he was then part of the Museum's recruitment scheme, he was appointed Assistant Curator of Birds and Reptiles. He went on to earn his MSc at University of Sydney in 1952. His combined Museum and academic schedule involved weekend fieldwork and writing during the week, as well as carrying out curatorial tasks and his participation in the production of public galleries and educational programs.

Keast's research program incorporated the traditional approach of studying external morphological variation of study skins in collections, but combined this with investigation of the environmental and behavioural factors that led to such variation, a break from the usual practice in avian systematics up to that time.

In 1953, the Museum granted him two years unpaid leave to accept a Saltonstall Fellowship and Fulbright Travel Grant to pursue a doctorate at Harvard University as the first graduate student of the eminent ornithologist, Ernst Mayr. His topic was the evolution of the Australian avifauna. His Ph.D. thesis, *Bird Speciation on the Australian Continent*, was published by the Museum of Comparative Zoology at Harvard (Keast 1961) and is one of the keystone works in Australian biogeography in general and avian evolution in particular. Although a

number of his conclusions have been modified or expanded since, this paper laid the baseline on which future studies by other workers were built—"a remarkable application of population systematics to a reconstruction of the pathways of speciation among the birds of Australia" (Mayr 1963, p. 30). Despite his ground breaking approach to avian distribution in Australia, Keast never fully incorporated this into a greater overview of the Australian and New Guinean avifaunas, of which Australia birds are a component.

His Ph.D. completed, Keast returned to the Museum in 1955, now with the position of Curator of Birds, Reptiles, and Amphibians. The next few years were highly productive, with Keast publishing a range of papers examining geographic variation in different groups of Australian birds, including revisions at generic level, such as bristlebirds (*Dasyornis*) (Keast 1957a) and grasswrens (*Amytornis*) (Keast 1958a), and at family level, including kingfishers (Keast 1957b), flycatchers and robins (Keast 1958b), estrildid finches (Keast 1958c), and cuckoo-shrikes (Keast 1958d). These were not simply listings of species and subspecies. He examined the environmental factors that promoted the differentiation. For some groups, it was looking at the influence on geographic differentiation of seasonal movements (woodswallows, *Artamus*, Keast 1958e; Weebill *Smicrornis brevirostris*, Keast 1958f; ephianurine chats, Keast 1958g) or feeding ecology (Mistletoebird *Dicaeum hirundinaceum*, Keast 1958h). Although not the first to address the roles of geographical barriers and refuges, Keast's work highlighted the importance of understanding their impact on avian distributions in Australia. In a paper using whipbirds (*Psophodes*) as a model, he proposed an evolutionary sequence to explain the origins of eastern and western species within a group (Keast 1958i). During this period, he also collaborated with Jock Marshall on a study of the impact of drought and rainfall on reproductive behaviour in Australian dry country birds (Keast and Marshall 1954).

While Keast's research was pioneering, his collection building was much less so. He conducted a few short trips and only one extensive one in April-May 1952. The latter was to central Australia with Roy D. Mackay and N. Camps. Mackay, who was a preparator at the Museum from 1944 to 1962, went on to manage the Baiyer River Bird of Paradise Sanctuary at Mt. Hagen, Papua New Guinea. The specimens obtained on this trip were valuable additions to collection, despite some displaying the effects of Keast's belief that it was better to have a

damaged specimen than no specimen and his use of heavy shot to ensure this.

He had a strong interest in public education on the subjects of natural history and conservation, writing popular articles and giving public lectures. Between 1958 and 1960, he started the first natural history series on Australian TV, a 15 minute segment between a religious message and the Mickey Mouse Club, presented every two weeks.

On an ill-fated skiing trip to Canada in the early 1960s—he broke his leg badly soon after arrival—Keast had an opportune encounter with the head of biology at Queens University, Kingston, Ontario. Owing to the severity of his injury, he was not permitted to travel immediately after release from the hospital, so was looking for some work in order to support himself. His chance meeting led to an invitation to lecture in comparative anatomy at the university. Although requiring him to get there on crutches, his stint at lecturing was very successful. The university offered him a position. Keast had felt that the Museum was not properly recognising his qualification with either his position or his salary, so when the university offered him a salary three times that he was making in Australia, as well as other opportunities, Keast accepted.

In Canada his major research shifted to fish, particularly the comparative morphology and competition in these fish communities in isolated lakes of southern Ontario, studies largely carried out at the University's Biological Station at Lake Opinicon. He became a full professor in 1965. When he retired in 1989, it was as Professor Emeritus.

His new focus on fish by no means indicated that Keast had abandoned birds. He continued publishing on Australian birds, writing on diverse topics such as movements (Keast 1968a), competition (Keast 1968b), and factors influencing moult in dry country birds (Keast 1968c). Being situated in North America facilitated Keast's extension of his studies to birds of the New World, including South America. Emphasizing that there were differences in the fauna of the southern continents, Keast published several papers comparing biotic evolution among these landmasses (e.g., Keast 1972). Another aspect that he examined was the relationship between morphology, adaptive space, and foraging behaviour in several groups of Australasian birds, including honeyeaters (Keast 1976a), Australo-Pacific warblers (Keast

1976b), species of *Gerygone* (Keast and Recher 1997), Australian and New Guinea insectivorous passerines (Keast 1996), and North American taxa, like the parulid Redstart (*Setophaga ruticilla*) (Keast et al. 1995) and kinglets (*Regulus*) (Keast and Saunders 1991).

During his annual summer trips back to Australia, he retreated to a small property on the Hawkesbury River. Here he carried out small research projects, which continued well after he retired. One that led to several papers was documenting the sequence of birds singing in the dawn chorus. To conduct this study, he would venture onto his verandah a half hour before first light, cup of coffee in hand, and record the timing and order of bird song as each species woke in the morning (Keast 1993, 1994a,b,c). Unfortunately, failing health eventually drew this practice to a close.

In his career, Keast wrote or edited at least 50 primary research papers and 60 book and conference chapters on functional morphology, communities, biogeography, migration, systematics, ecology, behaviour, and vocalisations of birds, and edited seven books on biogeography. He also published another 30 papers on his fish work.

One of Keast's great strengths was to synthesise information from various sources; another was to extract information from other workers in his role as editor. He edited *Migrant Birds in the Neotropics* (Keast and Morton 1980) and the large, multi-authored work, both the original (Keast et al. 1959) and subsequent (Keast 1981a) versions of the great three-volume work, *Ecological Biogeography of Australia*. His own chapter synthesised the interaction between birds and the Australian climate (Keast 1981b). Another important volume was *Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management* (Keast et al. 1985), published in association with the Royal Australasian Ornithologists' Union (see Recher and Pyke, this volume).

Keast was a long standing and active member of the Royal Australasian Ornithologists' Union and was instrumental in its revitalisation as a scientific organisation. After he was elected as a Fellow in 1960, he went on to be the longest serving fellow in the organisation's history. Even when in Canada, he maintained a strong interest in the Union. In 1995, he was rewarded the D. L. Serventy Medal for his contributions to the RAOU and to Australian ornithology. At various times in his career, he held temporary positions as Visiting Researcher at the Edward Grey Institute at Oxford University and

Visiting Biologist in South African National Parks, Pretoria, South Africa.

The largely integrative approach adopted by Keast, rather than more traditional taxonomic revisionary studies, meant that he described only two taxa, one as part of his review of the Weebill (*Smicrornis brevirostris cairnsi*) (Keast 1958f), the other, the Capricorn subspecies of the Yellow Chat (*Epthianura crocea macgregori*) (Keast 1958g) during his examination of differentiation in the family. *Rhipidura albiscapa keasti*, the dark northeastern population of Grey Fantail, was named by Julian Ford in his honour (Ford 1981). In a very non-ornithological recognition, K. V. Johansen named after him the city-state of Keastipol, on the coast of the Great Southern Continent, in her children's novel *Torrie and the Firebird* (Johansen 2006). One of many obituaries appeared in *Emu* (Boles and Recher 2009) and his unpublished and whimsical autobiography, *Bird Watcher to Professional Ecologist: A Humourous Career* (Keast 2008), is held by the Australian Museum Archives.

After Keast's absence and eventual departure to Canada, the role of combined Curator of Reptiles, Amphibians, and Birds was filled by Harold George Cogger (1935–) in 1959–1962. He had joined the Museum in 1954 as a cadet preparator and subsequently worked himself up the hierarchy to Curator and eventually Deputy Director. A herpetologist, Cogger had only nominal input into birds. In 1962, the position was split, with Cogger becoming Curator of Reptiles and Amphibians and the newly appointed H. J. Disney becoming Curator of Birds.

H. John de S. Disney (1919–).—After the departure of Keast, the then Director, John Evans, recruited Henry John de Suffren Disney (Figure 15) sight unseen from Africa upon the recommendation of Jock Marshall. The appointment of the Cambridge-educated Disney marked the first time since North that the Museum had a person occupying the position of Curator of Birds exclusively.

While in England, Disney had journeyed to collect in north Finland and Newfoundland, before seeing service as a photographer with the Royal Air Force during World War II. From there, he moved to Africa, first spending late 1946 to 1948 as Science Assistant to the Director of the Kaffrarian Museum, King William's Town, South Africa. After working as a cotton entomologist at a Cotton Research

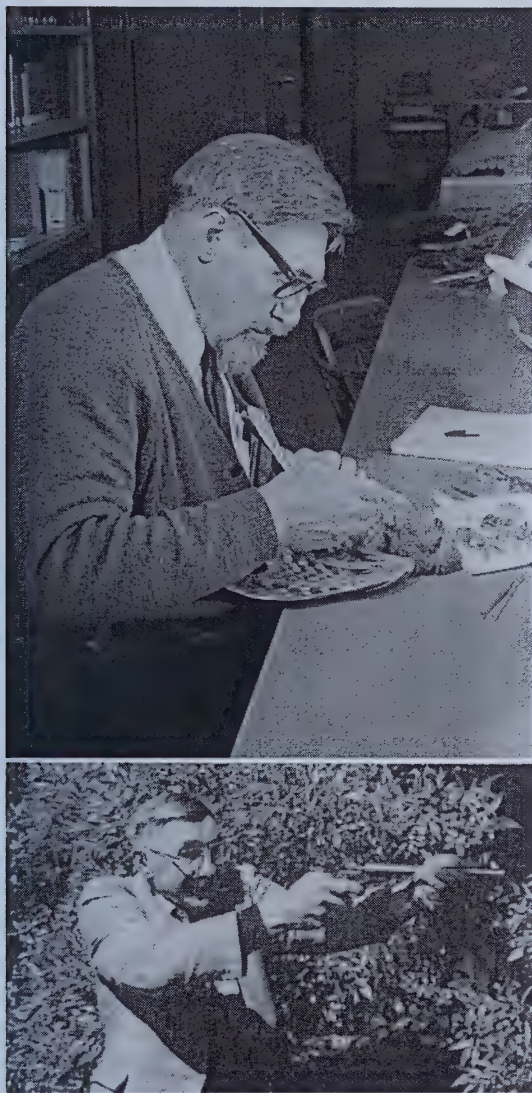


Figure 15. H. John de S. Disney, Curator of Birds, 1962-1979. Above, processing specimen. Courtesy Australian Museum Archives AMS391 M668(15). Below, demonstrating the use of his double barrellled .410 pistol. Photograph by and courtesy of Peter Fullagar.

Station in Tanganyika Territory (now Tanzania), East Africa (1948-1953), Disney spent ten years (1953-1962) as an applied biologist studying the control of species damaging crops and other food sources. After being engaged with Gambian Pouched Rats (*Cricetomys gambianus*) and African Clawless Otters (*Aonyx capensis*), Disney shifted to working on the biology and control of the Red-billed Quelea or Dioch (*Quelea quelea*), the world's most abundant wild species of bird. These granivorous birds roosted and nested communally in flocks of tens of thousands to millions and could quickly destroy a field of grain. Working with Jock Marshall, Disney investigated the birds' annual cycle based on plumage and gonad development in the lab (Disney and Marshall 1956, Disney et al. 1959, 1961, Marshall and Disney 1957), while conducting active management of breeding colonies. He delighted in illustrating his public talks in Australia with images of nesting trees being blown apart with explosives or incinerated with flame throwers.

Once he arrived at the Museum in 1962, Disney began a research program following on his studies of annual cycles. Many common Australian birds, mainly passerines, lacked detailed information on their sequence of plumage changes and sexual differences. Disney realised that existing collections contained too few specimens that had been properly sexed at the time of preparation, or that had breeding condition, soft part colours, and moult recorded. To obtain suitable material to fill these gaps necessitated the collection of large series of birds at different times of year. For many of the newly prepared skins, a wing was removed during the process and spread; these were stored separately from the skins. This collection, which grew to more than 1,500 skin/wing combinations, was invaluable for Disney's work on moult. The wings, together with close examination of each carcass before preparation, permitted moult sequences to be determined for a number of species. During the skinning process, specimens were checked for the degree of cranial pneumatisation as a means for determining relative age. Disney had started recording this feature while in Africa and subsequently published some of his findings on those birds (Disney 1980). The combination of inspecting cranial pneumatisation and cloacal tubules (for determining breeding condition in males of small passerines) led to his working phrase: "To tell the age, lick the head; to tell the sex, lick the other end." Another widely quoted aphorism of his was the saying, "What's hit is history, what's

missed is mystery,” popularised by Arthur Ransome (1947) but itself derived from Hood (1832).

During the years following North’s death until the appointment of Disney, collection growth had been rather slow, with the lowest rate of specimen registration per decade since the Museum’s inception. Under Disney, the collection underwent substantial expansion and development, assisted greatly by his preparators, initially Rolf Lossin and later Michael White. Disney’s primary collecting firearms were a double barrelled 12-gauge and a Belgian “double-barrelled .410 pistol, loaded on the left hip” (usually spoken as if a single polysyllabic word) (Disney 1993) (Figure 15). He proved very proficient with the latter, being able to collect swallows, bats, and flying insects on the wing. After a morning collecting, Disney had to hurry to a wedding before he could properly put his firearms away. The 12-gauge was broken down and put in his backpack, which was hidden behind a bush, but his pistol was carried into the chapel, hidden under his jacket, nestled in his armpit (Disney 1993).

Using criteria based on these “calibrated” series of skins, Disney published a succession of papers under the general title *Bird in the Hand*. Those that had been published up to 1974 were reissued as a bound volume under that title (Lane 1974) to appear in time for the International Ornithological Congress, held that year in Canberra. After retiring, Disney continued his studies of age and sex variation, incorporating the examination of captive birds at Taronga Zoo, to accompany his work with Museum specimens (Disney 1988, 1991, 1992).

He worked closely with the local bird-banding community, such as Ray Lonnon, Harry Battam, and others. One notable individual was Selwyn George (Bill) Lane (1922-2000), one of the organisers of banding in Australia, a founding member and President of the Australian Bird Study Association (ABSA), and Vice-president (1968-1969) and Fellow of the RAOU (elected 1983). Another was Alan Leishman, who, like Lane, was recipient of the John Hobbs Award from Birds Australia for “outstanding contributions to ornithology as an amateur scientist.” He served as editor of *Corella*, the journal of the ABSA.

During fieldwork, Disney noted that a good habitat in which to find one of his target species, the Flame Robin (*Petroica phoenicea*) (Disney 1969), were the plantations of introduced Radiata (Monterey)

Pine (*Pinus radiata*). Over the next few years, he combined his collecting trips to these forests with surveys of the native birds using these exotic landscapes. Published with his colleague Anthony Stokes, his paper was the first in Australia to examine how the avifauna adapted to this monoculture (Disney and Stokes 1976).

Disney and co-workers visited Mt. Gower on Lord Howe Island in 1969. Their objective was to locate and survey the Lord Howe Island Woodhen (*Gallirallus (Tricholimnas) sylvestris*), a flightless rail endemic to the island. As part of a biological survey of the island conducted by the Museum (see Recher and Pyke, this volume), Disney and Peter Fullagar (CSIRO Division of Wildlife Research) made several subsequent visits in 1971 and 1972. They found that there were fewer than 30 birds left on the tops of Mt. Gower and Mt. Lidgbird, making the Woodhen one of the rarest and most endangered avian species in the world (Disney 1974). Disney and Fullagar continued to visit the island to monitor the population, banding as many individuals as they could capture, and working out criteria for aging and sexing the birds (Disney and Fullagar 1984, Fullagar and Disney 1975, 1981, Fullagar 1985). Their work and recommendations led to the formation of a captive breeding program and concerted efforts to eradicate feral animals that were affecting the Woodhen. The Woodhen still exists in small numbers, which fluctuate between 117 to over 200 birds, but now occur in many lowland areas from which they had been extirpated. In recognition of Disney's work with this flightless rail, another, the fossil rail *Australallus disneyi* (formerly *Gallinula disneyi*), was named after him (Boles 2005b; Worthy and Boles 2011).

The recently formed National Photographic Index of Birds (see below) was in the process of building its collection and was particularly after species for which no photographs existed. One such species was the Eyrean Grasswren (*Amytornis goyderi*), which had been known from only three specimens collected in 1874. Sightings and subsequently a specimen acquired by the South Australian Museum during the early 1970s confirmed that this species still existed. In conjunction with Donald Trounson and Molly Clampett of the Index, Disney led a party from the Museum's Ornithology section, comprising his Technical Officer, Walter Boles, and the Curator of Birds at Taronga Zoo, Kerry Muller, to find and photograph the grasswren. Disney and Boles towed the Index's portable studio to Birdsville, Queensland, where they met the rest of the party. From a base camp in the eastern

edge of the Simpson Desert, Boles, Muller and two local guides/drivers headed west along the South Australian-Queensland border. On the final day, they found a small population of grasswrens. Several birds were captured and the first photographs of this species were obtained in the studio. These first appeared in the *Reader's Digest Complete Book of Australian Birds* (Reader's Digest 1976).

On the curatorial front, Disney instigated a number of important changes in practices. Until his time, specimen data were basic: registration number, name, locality, date, and sex, with the last three often minimal. (Supposedly the preparator indicated the sex of a specimen by the way the legs were crossed after skinning: left over right = male, right over left = female.) Biological data (measurements, gonad condition, moult, soft part colours, skull pneumatisation) had been recorded for a limited number of birds, but were not routinely assessed for incoming specimens. Disney introduced datasheets, which he had picked up from D. L. Serventy, to capture these data. A sheet was completed for each bird before being passed to the preparator.

Up to this point, skins had a numbered tag and, unless there was a written primary label as well, no other attached information. Disney had written labels made, using information taken directly from the registers. These made working with the specimens much easier, but were often difficult to read—neat handwriting was not a requirement for this task. Previous register entries all too often did not glean information from primary labels and sometimes differed from it. Newly designed labels captured the additional biological data being acquired and recorded on data sheets. For temporary field preservation of freshly collected specimens, Disney used a mixture of formalin and zalconium chloride—"Disney Goo"—placed on a piece of cotton wool and inserted into the body cavity after sexing (Disney 1979). Very reluctantly, he agreed to give up his use of D.D.T. and arsenic with specimen preparation and fumigation, although he retained a strong partiality towards these chemicals throughout his career.

Disney related how he had accidentally shot a few of his colleagues while pursuing birds (Disney 1993). In his version, a single pellet hit Basil Marlow, Curator of Mammals, when he was collecting a honeyeater in the field. According to the more dramatic version related by Marlow to the author, it had to do with an argument over porridge. As an Englishman, Disney had passionate views on how porridge should be cooked in the field. He developed a special insert for the

billy, so this could be filled with oats and water and then placed on the fire for an hour while some pre-breakfast collecting was carried out. That Marlow, also an Englishman, had equally strong but divergent views on porridge preparation led to strong disagreements in the field. On one occasion following a disagreement, Marlow stalked off to sit under a tree. Disney fired his shotgun into the branches, causing them to rain down on the shocked mammalogist. Disney was also noted for his prowess at judo (brown belt), which he used for party tricks, such as falling backwards off the back of a chair and doing a break fall into a standing position.

When Disney retired in late 1979, the Museum was again without a Curator of Birds, whether combined with other animal groups or not. This has not changed to the present. The day to day management of the Bird Section was left to Disney's Technical Officer at the time, Walter Boles.

AGAIN WITHOUT A CURATOR

Walter E. Boles (1952–).—Originally coming to Australia in 1974, a month after graduation with his B.Sc to be a high school teacher, Walter Earl Boles (Figure 16) quickly found that the profession was not for him. His background in zoology, including undergraduate study in ornithology, helped him get a Technical Officer position with John Disney in the Bird Section the following year. During the first few years, he took part in field trips to central eastern and north-eastern Queensland on the Museum's rainforest survey, as well as the expedition with Disney and the National Photographic Index in search of the Eyrean Grasswren (see account for Disney). The Museum was in the initial stages of computerising the collection registers and one of the first collections to be digitised was Ornithology. Boles oversaw the temporary staff assigned to transcribe the written records. He also began to reorganise parts of the skin collection, merging smaller collections that had until then been kept as separate entities. These projects continued after Disney's retirement in late 1979.

Up to that point under Disney, the Bird Section had been a two person department, with the Curator and an assistant. The Curator's position was advertised, but no appointment was made. In a second attempt some time later, an offer was made, but the chosen candidate



Figure 16. Walter Boles, Collection Manager, 1975-2012, and Jaynia Sladek, Technical Officer and currently Acting Collection Manager, 2004 to present, staging specimens during collection move into new building, late 2008. Photograph by Carl Bento, Australian Museum Photography Section.

did not accept. Soon after this, Basil Marlow, the Curator of Mammals, also retired, leaving two vacant positions. The move by the Museum into the computer era, not just in collection data basing, led to the decision to use one of these spots for someone to oversee this transition. Des Beechey was appointed from CSIRO for this role. The other vacancy would be advertised for a bird or mammal person, with only a single appointment. Tim Flannery, a mammalogist, was selected in 1984. This left Boles with the task of keeping the regular curatorial maintenance and acquisition operating, maintaining the curatorial projects he had initiated, and assuming most of the roles filled by the Curator. In this, he was assisted by intermittent funding to employ temporary assistants. The longer serving of these included Wayne Longmore, Terence Lindsey, Peter Rowland, Tessa Ivison, and Ian McAllan. The reorganisation of the skin collection was completed and the initial digitisation of all the registers was concluded. Backlogs of unregistered egg collections were incorporated into the database (see

below). Spirit and osteological holdings, which were minuscule at the time, were actively expanded. These projects were quite successful.

A range of productive fieldtrips were carried out over much of the continent: several to Clarke Range, Queensland, in search of the honeyeater eventually described as *Meliphaga hindwoodi* (see account for Longmore), Cape York Peninsula (1986) and, undoubtedly the most memorable, to northwest Western Australia and the Northern Territory (1990). The last was an extensive trip with Boles, Longmore, then employed at the Queensland Museum, and Max Thompson, Southwestern College, Kansas, United States. After six weeks of fieldwork, on their return through western Queensland, they headed south from Mt. Isa. On 17 October 1990, 36 km north of Boulia, the party stopped at the side of the road to look at some birds. Happening to look down, Boles noticed on the roadside, next to his foot, the carcass of a Night Parrot. The body was not fresh, the muscle being desiccated, ants having removed much of the soft tissue, and the bird flattened laterally. Without doubt this individual was killed by a motor vehicle, but it is uncertain whether the parrot died at the location where it was found, or was transported in the grill of the vehicle for some indeterminate distance before falling by the roadside.

The Night Parrot holds a special place in Australian ornithological lore. With only 23 known specimens up to that time, and having been pronounced extinct on at least one occasion, it is the Thylacine (*Thylacinus cynocephalus*) of Australian birds. The only previous specimen in the 20th century was in 1912, 78 years earlier. Because this parrot is terrestrial and nocturnal, running around on the ground like a quail, and occupies some of the most inaccessible country, it is arguably the least known of Australian birds. The serendipitous discovery of the carcass, and its demonstration that the species still existed, was an exciting event—but there was more. Dick Smith, of *Australian Geographic*, had offered a \$50,000 reward for evidence of the continued existence of the Night Parrot. In due course, the Museum claimed the money, used to fund further fieldwork in search of this species, although this has been unsuccessful to date. A more detailed account of this discovery can be found in Boles et al. (1991, 1994) and Weidensaul (2002).

Through reclassification, Boles progressed to Senior Technical Officer and then Scientific Officer when the position of Collection Manager was formally created during restructuring. He could now

incorporate some research into his activities. From Disney, he inherited an interest in moult and ageing in songbirds, but his greatest attraction was to the evolution, biogeography, and systematics of Australasian birds. The various flycatcher groups were of particular appeal, and he authored *Robins and Flycatchers of Australia* (Boles 1988), one of the National Photographic Index series on Australian birds, as well as five family chapters in the *Handbook of Birds of the World* (Boles 2006, 2007a,b,c,d). Boles completed a Ph.D. in palaeo-ornithology in 2000, with a thesis on the evolution of the Australian Tertiary avifauna. Among the fossils described were small bones from Eocene deposits that he identified as belonging to the Passeriformes, the oldest known songbirds in the world (Boles 1995a, 1997a). (There has recently been some doubt expressed about this allocation for one of the specimens.) A diverse range of fossil taxa was described from Oligo-Miocene deposits at the Riversleigh World Heritage Area, north-western Queensland, and from central Australia, including emus (Boles 1992, 1997b, 2001a), megapodes (Boles and Ivison 1999), birds of prey (Boles 1993a), storks (Boles 2005a), rails (Boles 2005b), cockatoos (Boles 1993b), swiftlets (Boles 2001b), kingfishers (Boles 1997c), and a variety of passerines (Boles 1993c, 1995b, 1999, 2005c). Another interesting find was a Pliocene-aged parrot indistinguishable from the living Budgerigar (*Melopsittacus undulatus*) (Boles 1998).

Publication by the Royal Australasian Ornithologists' Union of the *Handbook of Australian, New Zealand and Antarctic Birds* series was underway and the organisation required an up-to-date taxonomic list as a basis for the sequence adopted. Les Christidis, Museum Victoria, was approached to produce such a list and he, in turn, invited Boles to collaborate in its compilation. This appeared in 1994 (Christidis and Boles 1994). It was soon out of date, and 14 years later they published a completely rewritten and expanded production (Christidis and Boles 2008).

By the late 1980s, much of the temporary funding had dried up and Boles was forced to operate without assistance for much of the time. Another restructure in 2004 restored a second permanent position in the Section with the transfer of Jaynia Sladek (Figure 16) into the role from elsewhere in the Museum. Her arrival was particularly fortuitous. Around 1990, several collections suffered the depredations of a Museum employee who, having access to storage spaces, began to steal specimens. Much of the material was subsequently recovered, but

it created numerous problems of reincorporating the material into the collection (see below). Sladek worked extensively and effectively at repatriating many of the specimens, work that unfortunately still continues.

Boles served as President (1984-1987) and Editor (1988-1991) of the Australian Bird Study Association, a Councillor of the Society for Avian Paleontology and Evolution (2004-2008), and an Australian representative on the International Ornithological Committee since 1998. He described a range of extant and fossil taxa, including, with Wayne Longmore, the Eungella Honeyeater (*Lichenostomus hindwoodi*) and several subspecies obtained on the same trip (Boles 1983, Boles and Longmore 1983, Longmore and Boles 1983). Fossil species include the small megapode *Ngawupodius minya* (Boles and Ivison 1999), flightless rail named for John Disney (*Gallinula disneyi*, now *Australallus disneyi*) (Boles 2005b, Worthy and Boles 2011), and a bird of prey (*Pengana robertbolesi*) and a stork (*Ciconia lousebolesae*), named for his father and mother, respectively (Boles 1993a, 2005a). Longmore and he are commemorated in the generic name *Bolemoreus* (Nyari and Joseph 2011).

N. Wayne Longmore (1948–).—Noel Wayne Longmore (Figure 17) was a birdwatcher from an early age, coming under the influence of Keith Hindwood and others when 14. During stints being employed as a ranger at Kosciusko National Park and Nadgee Nature Reserve, and then working in Rockhampton, Queensland, he conducted surveys of the local avifauna and published the results (Gall and Longmore 1978; Longmore 1973, 1978). During a break in a two year period in the Army, Longmore was invited on a fieldtrip to north-east Queensland as part of a survey of east coast rainforests being conducted jointly by the Australian and Queensland Museums (Broadbent and Clark 1976; Boles and Longmore 1989).

In a subsequent break, he volunteered to help reorganise parts of the skin collection. When he worked his way through the honeyeaters (Meliphagidae), he came across a specimen that was not what the label said. This single specimen had been collected in 1975 during an earlier rainforest trip to central coastal region of eastern Queensland. It came from Clarke Range and was labelled with the name *Meliphaga frenata*, the Bridled Honeyeater. According to field guides, this was the species that occurred in the Clarke Range area, extending northwards through



Figure 17. Wayne Longmore (left, holding bird) and Terence Lindsey (right, sketching), northern New South Wales en route to Clarke Range, Queensland, on initial Eungella Honeyeater expedition, 1978. Photograph by and courtesy of Ann Lindsey.

the Atherton Tablelands. Clarke Range, about 65 km (40 miles) inland from Mackay, is just far enough off the beaten track that few birdwatchers made the detour from well-known birdwatching localities

to the south (Rockhampton) and north (Townsville), both on the major highway. As a result, the area's avifauna had not received much attention and was generally regarded as being of minor biogeographical significance.

Longmore realised that this specimen was not a Bridled Honeyeater as its tag said. The problem was that it was a young bird, which may have had plumage differences from an adult. In fact, it did not match any species in the books. Longmore began researching the identity of the mystery bird. One of the few trips to this area for which there were published details took place in 1959, and the published report (Robertson 1961) had subsequently become the source of the distributional information found in field guides. Robertson and his friends had captured a bird that they identified as a Bridled Honeyeater and included a photograph of it with their article. Longmore recognised the important feature of bill colour, which showed conclusively that the bird illustrated was not a Bridled Honeyeater. As the bird shown was an adult, it compared favourably with the younger specimen, agreeing in several ways, especially around the facial area. Despite the photograph being published in *Emu*, the misidentification had escaped the notice of all other ornithologists.

After Disney's retirement and following his discharge from the Army, Longmore was employed as a temporary assistant in the Bird Section. His interest in the honeyeater prompted a visit back to Clarke Range. An initial trip in 1978 and a subsequent one in 1980 found the birds to be relatively common in a small localised area at higher altitudes. Longmore and Boles described it in 1983, officially naming it as *Meliphaga hindwoodi*, the Eungella Honeyeater, in honour of Keith A. Hindwood, Longmore's childhood mentor (Longmore and Boles 1983). This was one of last new species of birds discovered in Australia. It was subsequently transferred to the genus *Lichenostomus* and then to a new genus, *Bolemoreus*, recognising the two describers, when the former genus was found to be polyphyletic (Nyari and Joseph 2011).

One of Longmore's most significant activities was the registration of the outstanding egg collections that had been acquired in the 1930s and thereafter (see below). He and Boles collaborated on a number of fieldtrips to different parts of the continent, publishing short papers and more extensive systematic work (Boles and Longmore 1979, 1983, 1985a,b, 1989, Longmore and Boles 1983). On one of these trips,

Longmore found the nest and eggs of the White-lined Honeyeater (*Meliphaga albilineata*), which had until then been unknown (Longmore 1983).

As funds permitted, Longmore worked in the Section until 1983. His ornithological expertise and curatorial experience was recognised by the Queensland Museum, who head hunted him in 1983 and he took up a permanent position there until 1994, at which time he resigned after a huge disagreement. He returned for several periods with the Australian Museum, the Australian National Wildlife Collection (1994-1995), and NSW Forests (1998-1999) as a senior ecologist, before accepting the role of Collection Manager at Museum Victoria in 2001, in which position he still resides. Throughout this time, Longmore has retained a strong interest in taxonomy, behaviour, and the oology and nidification of birds, particularly those of Australia. Among his most notable publications is *Honeyeaters & their Allies of Australia* (Longmore 1991b), probably the most widely sought volume of the National Photographic Index bird book series. Another is his compilation of an updated and amended list of avian types for the Australian Museum collection (Longmore 1991a). A fossil songbird, *Longmornis robustirostrata* (Boles 1999), was named for him. He is a research associate of the Australian Museum.

Terry Lindsey (1941–).—Terence Robert Lindsey was born in England, raised and educated in Canada, and moved to Australia in 1969, where he worked as a freelance ornithologist, writer, and wildlife painter (Figure 17). His text accompanied the amateur paintings of Gladys O'Grady (O'Grady 1979). Following Disney's retirement, Lindsey assisted in the Bird Section on temporary funds, carrying out a variety of curatorial tasks and, together with Longmore, registering the egg collections that had languished for many years. During this period, he was part of the fieldtrip that travelled to the Clarke Range to locate the mystery honeyeater. His skills as an accomplished bird artist were put to use to produce the colour painting that accompanied the description of the Eungella Honeyeater (Longmore and Boles 1983). For the publishers Angus & Robertson, he revised Neville Cayley's long-time favourite bird guide, *What Bird is That?* (Cayley 1984), which proved to be a best seller. This deluxe version contained never before published colour portraits of birds. For species discovered or recorded for the first time in Australia since the book was first

published in 1931, such as the Eungella Honeyeater, Lindsey provided new paintings. He began a long standing association with the National Photographic Index of Australian Birds (see below) in the early 1980s, by writing the seabird volume of the Index's Australian bird book series (Lindsey 1986). After this he was involved in editing subsequent volumes and sourcing photographs, in the case of the shorebird volume (Pringle 1987) from workers in a number of Northern Hemisphere countries. Other projects were the production of bird call cassettes, entitled *What Bird Call is That?* (Lindsey 1987), for which he also provided the text, and writing the bird volume of the *Encyclopedia of Australian Animals* (Lindsey 1992). Following completion of the bird book series, he moved away from Sydney. In his career of over 30 years, he ran ornithological courses at universities, directed and/or scripted wildlife documentaries for television (e.g., GEO productions, Television New Zealand Natural History Unit) and wrote extensively with a range of books, articles, and encyclopedia entries. His most recent publication is the volume on albatrosses (Lindsey 2008) for the CSIRO Publishing's Australian Natural History Series. Several of his paintings currently adorn the walls of the Museum's boardroom.

Leslie Christidis (1959–).—A prominent ornithologist at the Museum who was not in the Bird Section was Leslie Christidis (Figure 18). After working at Museum Victoria as Senior Curator of Birds (1987–1996), then Science Program Director, and later Head of Department of Sciences (until 2004), he accepted an appointment at the Australian Museum in 2004 as Assistant Director of Science, a post he held until 2009. Christidis carried out research on the evolution and systematics of birds using molecular techniques, the first ornithologist at the Museum to employ this approach. Following a B.Sc (Hons) at the University of Melbourne (1980), he pursued a Ph.D. at the Australian National University on the evolutionary genetics of Australian finches (Estrildidae) (Christidis 1983, 1985, 1986a,b,c, 1987a,b,c). He received his doctorate in 1985. From there he had posts at the Australian National Wildlife Collection (ANWC), CSIRO, Canberra, first as a CSIRO post-doctoral fellow in 1985–1986 and then on a Queen Elizabeth II fellowship in 1987. Together with Richard Schodde, Director of the ANWC, Christidis conducted extensive fieldwork, including in Papua New Guinea, and published extensively on a number of avian systematic projects (Christidis and Schodde 1992,

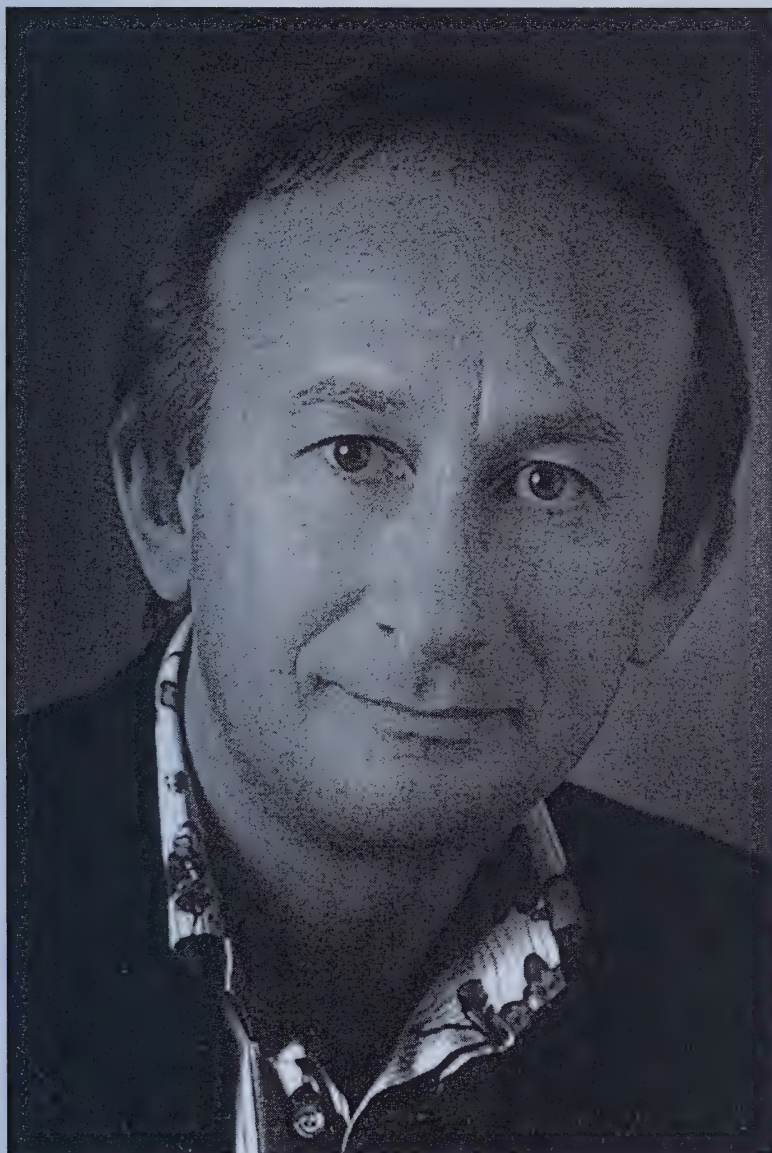


Figure 18. Leslie Christidis, Assistant Director, Research and Collections, 2004-2009, soon after joining the Australian Museum, 2004. Photograph by Carl Bento, Australian Museum Photography Section.

1993a,b, 1997, Christidis et al. 1993, Schodde and Christidis 1987). One of the most significant papers supported the origin of the songbirds (Passeriformes) in Australasia (Christidis and Schodde 1991). Christidis accepted the position at Museum Victoria later that year (see Longmore this volume). While there, he began a highly productive partnership with Janette Norman, a molecular systematist at that institution. Together they published over 40 papers on avian systematics, evolution and biogeography, and conservation genetics (e.g. Christidis and Norman 2003, 2010, Christidis et al. 1996, Norman et al. 2002, 2007, 2009a,b). The fairy-wrens (Maluridae) have been consistently studied by Christidis throughout his professional career, using changing molecular approaches and focussing on different aspects of their evolutionary history (Christidis 1999, Christidis and Schodde 1997, Christidis et al. 2008, 2010, Schodde and Christidis 1987). In 2005, he was awarded with a W. Roy Wheeler Medallion from Bird Observation & Conservation Australia (BOCA), which honours worthy individuals who have been outstanding contributors, innovators, and leaders in field ornithology in Australia and its territories.

Even before coming to the Australian Museum, he worked jointly with Boles on several projects. Their most prominent collaborations were the compilation in 1994 of *The Taxonomy and Species of Birds of Australia and its Territories* (Christidis and Boles 1994) and its successor, *Systematics and Taxonomy of Australian Birds* (Christidis and Boles 2008). Other papers included phylogenetic studies of the Australo-Papuan robins (Petroicidae) (Christidis et al. 2011) and the grasswrens (*Amytornis*) (Christidis et al. 2010). In all, Christidis has authored or co-authored over 130 publications, most related to birds, but he has also looked at mammals and even bryozoans. With Schodde, he named the subspecies of the Grey Grasswren (*Amytornis barbatus diamantina*) (Schodde and Christidis 1987). Findings from his studies have led to the recognition of previously unrecognised levels of differentiation in groups such as the *Meliphaga* honeyeaters (Norman et al. 2007), *Amytornis* grasswrens (Christidis et al. 2010), and petroicid robins (Christidis et al. 2011). As a result, several taxa previously regarded as subspecies have been elevated to species level. Christidis is currently Director, National Marine Science Centre, Southern Cross University, and continues to publish extensively on birds.

PAINTERS

The Museum's specimens have been used frequently as the basis for paintings and other illustrations. Artists creating images for field guides, the *Handbook of Birds of the World* (del Hoyo et al. 1992–2011) and, particularly, the *Handbook of Australian, New Zealand and Antarctic Birds* (Marchant et al. 1990–2006) have accessed skins and wings on a regular basis. Several painters and artists, past and present, merit extra comment.

Harriet (1830–1907) and Helena (1832–1910) Scott are best known for their insect illustrations, particularly of butterflies and moths, and are considered among the best scientific artists produced in Australia. The Scott sisters also illustrated books on terrestrial molluscs (Cox 1868), snakes (Krefft 1869), and mammals (Krefft 1871). They corresponded extensively with Ramsay and Harriet produced the colour paintings of eggs that accompanied several of his oological papers, including the series not completed owing to Gould's intervention (Ramsay 1867a); illustrations for subsequent parts, although completed, were never published.

Lilian Marguerite Medland (1880–1955) (Figure 11), wife of Tom Iredale, has been mentioned previously as the illustrator for her husband's books, *Birds of New Guinea* (Iredale 1956), *Birds of Paradise and Bowerbirds* (Iredale 1950), and an unpublished work on kingfishers. While a young woman in England, she produced 318 monochrome plates for Charles Stonham's five volume work *The Birds of the British Islands* (Stonham 1906–1911) and 248 paintings for a planned but never published revision of William Yarrell's *A History of British Birds* (Yarrell 1843). Medland also illustrated Australian species for Gregory Mathews, creating 53 plates of 883 birds. The Museum hired her to do paintings for a series of postcards, of which 30 species were illustrated. See Kloot (1983b) for additional information.

Neville William Cayley (1886–1950) is best known for his pioneering book, *What Bird is That?*, first published in 1931 (Cayley 1931), and reprinted over many years in many editions. He followed this with *Finches in Bush and Aviary* (Cayley 1932), *Budgerigars in Bush and Aviary* (Cayley 1933), *Australian Parrots* (Cayley 1938), and *The Fairy Wrens of Australia* (Cayley 1949), as well as the illustrations for *What Butterfly is That?* (Waterhouse 1932) and *Furred Animals of Australia* (Troughton 1941). For *What Bird is That?*, Cayley created

plates with smaller images of birds set out in the style of a field guide on a white background. He also did a series of larger full frame paintings with coloured backgrounds and vegetated settings. On the back of each of these, he noted the registration numbers of the Museum specimens on which they were based. These illustrations, previously unpublished, finally appeared in 1984 in an enlarged edition of the book, revised by Terence Robert Lindsey (see above). Cayley assembled over 500 colour paintings in anticipation of a planned comprehensive publication on Australian birds and their nidification, but unfortunately this never eventuated. A fire in 2002 destroyed almost all of the original paintings. In addition to using Museum skins for his work, Cayley provided specimens and named three species of owl (Cayley 1929, 1931), all now synonymised. He served as president of the Royal Australasian Ornithologists' Union (1936-1937) and of the Royal Zoological Society of New South Wales (1932-1933). A short biography was provided by Chisholm (1979).

His father, Neville Henry Pennington Cayley (1853-1903), was also an artist. He illustrated North's *Descriptive Catalogue of the Nests and Eggs of Birds found Breeding in Australia and Tasmania* (North 1901-1914) with black and white drawings and some hand coloured plates of eggs.

While visiting the Museum in 1968 to paint from a specimen, William Thomas Cooper (1934-) was noticed by Keith Hindwood, who subsequently invited him to illustrate a book, *A Portfolio of Australian Birds* (Hindwood 1968). This publication brought Cooper to the attention of others and he soon settled into a relationship with Joseph Forshaw that has for over 20 years produced detailed, exquisitely illustrated works, including *Australian Parrots* (Forshaw 1981a, 1989), six volumes of *Kingfishers and Related Birds* (Forshaw 1983-1994), *Birds of Paradise and Bowerbirds* (Cooper and Forshaw 1977), *Parrots of the World* (1973, 1981b), *Cockatoos: A Portfolio of All Species* (Forshaw 2001), and *Turacos: A Natural History of the Musophagidae* (Forshaw 2002). Cooper also did the paintings for *The Birds of Paradise: Paradisaeidae* (Frith and Beehler 1998). He is regarded by many as one of the finest bird artists in the world. The Academy of Natural Sciences, Philadelphia, awarded Cooper with their gold medal in 1992 for distinction in natural history art—in 190 years he is the first and only Australian recipient—and in 1994 he received

the Order of Australia (AO) for his contribution to art and natural history.

His collaborator, Joseph Michael Forshaw (1939-), worked with the CSIRO Division of Wildlife Research and the Australian National Parks and Wildlife Service. He was a Churchill Fellow in 1970 and was awarded the Queen's Silver Jubilee Medal in 1977. Forshaw has been a research associate of the Museum for many years. Ornithological books he has published with other artists include *Parrots of the World: An Identification Guide*, illustrated by Frank Knight (Forshaw 2006), and *Trogons: A Natural History of the Trogonidae*, illustrated by Albert Earl Gilbert (Forshaw 2009).

COLLECTIONS

The bird collection has been accumulated over almost 180 years. Currently, the number of registrations approaches 89,000, but the actual extant holdings are fewer, with a number of specimens exchanged, destroyed or lost. To further complicate an exact figure, a small number of entries relate to multiple items.

Registers.—There is limited information about the earliest collections. The first register was compiled by Edward Palmer (the “Palmer Register”) in 1877-1880 to bring all the Museum's specimens into a single ledger with unique registration numbers (more or less—some collections were entered with little more than “a collection of birds”). This register included not only birds, but all other animals, geological specimens, and ethnographic material, interspersed in no particular arrangement. It had not been completed by the time of Palmer's departure. The Palmer Register was followed by the “A” Register and then the “B” Register, both with similar systems of including a mixture of all animal, geological, and ethnographic categories. The “O” Register, restricted to birds, was started in 1886, as were other registers dedicated to specific collection areas. In all, the Palmer Register contains 3,891 bird registrations, the A Register 8,399 and the B Register 2,505. In the O Register, which is active and growing, there are more than 73,000 registrations. Running in parallel to the registers into the late 1970s was a card file with an individual

index card for each specimen containing the same information as the register entry.

Before the Palmer Register there was no unified catalogue of the specimens, each being labelled individually, without unique identifying numbers. Bennett's catalogue of specimens in the Museum in 1837 did not cite collectors by name, although for several specimens it indicates that these were acquired through Mitchell's expedition. Because specimens lacked unique numbers or other means of matching them to entries in that catalogue, it is not possible to recognise which, if any, of the specimens were collected by Holmes, Galvin, Roach, or Bennett himself. The situation did not improve when Wall or Krefft were in charge.

Of the earlier specimens, 3,600 are collectively cited as "Old Collection." It is possible to find specimens listed in the registers that are likely to be those cited by Bennett by virtue of being the only ones of that species held at that time. Unfortunately, most have been either destroyed or subsequently exchanged with other institutions. For other taxa there were additional specimens acquired since Bennett's catalogue, which confound recognition of early holdings and no further progress can be made.

There are also specimens mentioned by Bennett that have obviously disappeared. He included several rarities (now extinct), with no indication of from where they were obtained: Ivory-billed Woodpecker (*Campephilus principalis*), Norfolk Island Pigeon (*Hemiphaga spadicea*), two Norfolk Island Kaka (*Nestor productus*), and White-breasted White-eye (*Zosterops albogularis*), also endemic to Norfolk Island. One Kaka was sent by Wall to the museum in Melbourne (Longmore, this volume); the other is still in the Museum's collection. Of the other birds, none remains. These were never included in the written registers. Perhaps they were among the specimens that Trustees during Krefft's time added to their personal collections.

The large, leather-bound registers were handwritten, sometimes with elegant penmanship, sometimes with almost illegible scribbles, until the late 1970s. At this time, the Australian Biological Resources Study (ABRS), a Commonwealth government section, established "to provide, through strategic partnerships, the underlying taxonomic knowledge necessary for the conservation and sustainable use of Australia's biodiversity" (ABRS 2011). ABRS provided funds to the Museum for digitisation of collection databases. The first collection

done was herpetology, followed by ornithology. Temporary staff transcribed information from the old registers onto special sheets, which were then sent away for bulk keyboarding. While the initial data capture was supported by ABRIS, the subsequent cleaning up of the data was the role of the Museum. Correcting the information took many years, owing to the errors introduced by semi-illegible old handwriting, original misspellings, transcription errors, and a host of former names that had since been reduced to synonymy. The database now operates on the Unix-based EMu (Electronic Museum) from KE Software in Australia.

Acquisition and collections.—The rates of acquisition have varied considerably over time. Compared by decade, the highest rates were during the times of Ramsay (1880-1889), North (1910-1919), and Disney-Boles (1970-1999). The 1910-1919 peak reflects, in part, the incorporation of the personal collections of Ramsay and North. A slowdown took place during the years after North's death, through the periods of Kinghorn and Keast. Several large collections were received during their times, but not incorporated into the Museum's holdings until some years later.

Once mounts were no longer the primary form of preparation and skins grew in importance, the latter soon became the more numerous specimens in the collection. Donations were received, but most of the incoming material was provided by collectors, both staff and non-staff who usually did this for money. Unlike the current situation, the ability to skin birds was a rather common skill during the early days. Ramsay's collection building included extensive exchanges for non-Australian material, a practice that continued with North. They were fortunate that there was a considerable overseas demand for Australian specimens and those from New Guinea and the Pacific islands. In some instances, specimens were obtained from collectors and within a few weeks were shipped overseas on exchange to another institution. During the Ramsay-North years, exchanges were carried out with most state museums in Australia, as well as other educational institutions. In addition, even greater numbers of specimens were swapped with museums in New Zealand, Canada, United States, Argentina, Chile, Italy, Austria, France, Scotland, England, Belgium, Germany, Poland, Finland, Norway, Netherlands, Greece, India, China, Japan, Straits

Settlements (British Territories in Southeast Asia), and South Africa, as well as with private individuals.

Several discrete collections were acquired through purchase, exchange or donation. Some, such as Ramsay's (Dobroyde) and Grant have already been mentioned. A few others are of particular attraction.

An interesting collection of New Guinea birds was acquired in 1883 from the mercantile firm, Mason Brothers, the Sydney agents for the New Guinea collector Andrew Goldie. Ramsay (1883b) noted that the Museum had "received . . . collections containing over 1,000 skins collected by Messrs. Rolles and Hunstein and others." Lecroy (1969, p. 445), in a list of collecting expeditions to New Guinea and the museums at which the specimens obtained on each were held, cited one trip in 1878, noting "Carl Hunstein joined Andrew Goldie; Astrolabe Mts and mountains to the east. Disposition of specimens unknown." The "Mason Brothers collection," as it is referred to informally, is likely to be that collection. Unfortunately, little documentation was retained with the specimens, any field tags having been removed. The subspecies of birds indicate that the collection originated from the southeast region of New Guinea from where Goldie and his colleagues were operating (Longmore 1991b).

Two collections were received from P. J. (Wilfred) Plowden-Wardlaw, a Scottish philanthropist. He had a colourful history: time at his uncle's estate of Craigie, Scotland, a period in Rhodesia (now Zimbabwe), and then in Chile, leaving the last after his business of manufacturing raincoats was terminated by the 1931 revolution. He eventually moved to New Zealand to join his grandmother's brewery company as a beer salesman. His collecting interests, which had started in Scotland, developed in New Zealand. Following a visit to the Australian Museum and meeting Iredale and ichthyologist Gilbert Whitley, Plowden-Wardlaw offered to provide specimens. The first was a collection of New Zealand birds originally intended for the Royal Scottish Museum. With the war looming, it was not possible to send these to Britain, so Plowden-Wardlaw sent the specimens to the Australian Museum. He lacked an export permit, but, despite efforts by the New Zealand authorities to prevent the shipment, the collection of almost 400 birds arrived intact in Sydney and was incorporated in 1939. As Keast (1995, p. 32) related the story, "Wilfred painted for me a glowing final scenario of half a dozen fussy little New Zealand gunboats valiantly trying to intercept the departing freighter." This

collection, mainly assembled from birds purchased from collectors, varies in the quality of its preparation and, while most specimens have data, this information is contained only on labels. The second collection, accumulated after moving to Canada and received by the Museum in 1948, consisted of over 700 Canadian birds, mainly British Columbian, plus 30 from the United States, all beautifully prepared and extensively documented in accompanying notebooks. Plowden-Wardlaw eventually shifted to the West Indies as an agent for the brewery. His offer to assemble a third collection, comprising West Indian birds, was apparently turned down by the Museum management—“For Heaven’s sake do not inflict any more foreign specimens on us” (Keast 1995, p. 32)—much to the disgust of Keast and Iredale (Keast 1995). In later years, Plowden-Wardlaw adopted the name The Campbell of Craigie.

While not a large collection, comprising about 100 specimens, the Gibson-Sefton Collection is an important one because of the number of unusual seabirds that it contained. This was developed by two amateur ornithologists from the Wollongong area, John Douglas (Doug) Gibson (1925-1984) and Allan Roy Sefton (1921-1989). They and others regularly walked the beaches, picking up birds that died and washed up on the beach. These were prepared by Gibson and included a number of rarities, including a few first records for the state or country (e.g., Gibson and Sefton 1956, 1959, 1961). Gibson and Sefton were instrumental in establishing a program of banding albatrosses away from their breeding sites by developing a hoop net that could be cast over birds sitting on the water. More than 10,000 captures were made using this net. They also helped establish the New South Wales Albatross Study Group. Gibson is commemorated in the name Gibson’s Albatross (*Diomedea (exulans) gibsoni*). He devised a coded system of describing the plumage stages of the different forms of the Wandering Albatross (*Diomedea exulans*) (Gibson 1967). Known as the Gibson Plumage Index, or more simply the Gibson Code, this was adopted by albatross workers internationally. Sefton was awarded the British Empire Medal in 1975, Australian Natural History Medallion in 1978, and OAM (Medal of the Order of Australia) for service to conservation in 1989. He died a few days before he was to receive an honorary doctorate from the University of Wollongong to honour his work as a naturalist and conservationist. In his memory, the Allan Sefton Memorial Lecture is given annually since its inauguration in 1993.

Harry F. Recher, then Head of the Department of Environmental Studies at the Museum, presented the inaugural lecture (see Recher and Pyke, this volume).

Perhaps equally important as the active collection of birds have been donations. On a large scale, several sources stand out. The Royal Botanic Gardens was the site of Sydney's first zoo. This opened in 1862 and continued until 1883, at which time the animals were moved to Moore Park. Even at this early date, the zoo was receiving a number of exotic species from overseas sources, some probably the first occurrence of a taxon in Australia. Any deaths came to the Museum. The current zoo, Taronga Zoological Park, once held a very diverse collection of non-Australian taxa. The receipt of these by the Museum after their death was important in building up some poorly or otherwise unrepresented parts of the collection. Stricter import regulations implemented since then mean that most of these species have not been replaced by the Zoo.

The most productive source of donations has been the NSW National Parks and Wildlife Service. Several offices around the state hold freezers into which dead animals found by its staff, brought in by the public, or received from wildlife rehabilitation groups are stored. When this system was started, the bodies were delivered to a single site in northern Sydney and looked after by Anthony (Tony) Barclay Rose. Rose, an associate of the Museum was, at various times, a game keeper/poacher in England and a sniper in New Guinea during the war, before becoming one of the last old style naturalists employed by the Park Service. His broad knowledge across plant and animal groups kept him busy long after retirement, as many researchers came to him for identification of prey remains and stomach contents. When Rose retired, there was no central location for the accumulation of frozen specimens. Museum staff now make periodic trips to park freezers around the state to clear out the hundreds of bodies received each year. Rose accumulated extensive notes on his analyses, but rarely published this information while working (Rose 1973). With encouragement and assistance from other workers, many of his personal records, largely about diets of different species, have been written up for publication (Barnes et al. 2005, Debus and Rose 1994, 2000, 2006, Debus et al. 2008).

Types.—The Museum holds about 340 primary and secondary types of about 180 taxa (Longmore 1991b). Most represent taxa described by Ramsay and North, who were by far the most prolific of any Museum ornithologists. The total also includes a small number sent to the Museum on permanent loan from the Macleay Museum, University of Sydney (Stanbury 1969). The initial list of avian types in the collection was compiled by Hindwood (1946). Several of Ramsay's new taxa were represented by a series of specimens ("co-types" = syntypes). From these, Hindwood selected a type (= holotype), citing the others as paratypes. He also on occasion indicated both a male and female of a species as types. The type list was updated by Longmore (1991b). He corrected some of Hindwood's errors and recognised as lectotypes and paralectotypes those that Hindwood had designated as types and paratypes from syntypic series. Longmore also identified and removed from the type collection 21 specimens that had been incorrectly included. The status of some specimens remains inconclusive owing to the failure of early workers to explicitly indicate their types on labels. There are six taxa for which the types, mentioned in the registers, have not been located. Another 16 named forms were described by Museum workers, but appear not to have ever been part of the collection.

Specimen preparation and forms.—Skins and mounts were for many years the primary preparation forms of bird specimens. Now, in addition to these, incoming acquisitions may be prepared in a range of other forms.

Wings.—The wing collection, started by Disney, is kept in the same room as the skins, but held separately therein. Each wing is individually kept in a sturdy plastic bag for support, which in turn is placed in a thinner zip sealing bag. This permits easy access to a wing should it need to be removed, although in most cases necessary detail can be ascertained by examination through the clear plastic. Small wings are kept in a filing cabinet, larger ones in skin cabinet drawers. The preparation of wings slowed considerably after Disney's retirement, but did not cease entirely. The emphasis is now on filling missing age, sex, and moult stages on an opportunistic basis.

TVT.—Whereas Disney's specimens comprised a skin with the wing removed, the retention of a wing alone is now more common owing to a recently introduced method that is again expanding the wing collection. Nicknamed "Tissue-Voucher-Toss," or TVT, it addresses the number of bodies received as donations that have acceptable collection data (locality, date), but would not otherwise be incorporated into the collection because of damage, age, or being of low priority for preparation. Date, locality, mass, selected measurements, and sex/gonads are recorded, plus any other aspect deemed important for a particular individual bird, but without the detail noted on datasheets. A tissue sample is taken, with a wing removed and prepared as the voucher. The remainder of the specimen is discarded (tossed). This has proved to be a quick and effective way of developing the vouchered tissue holdings from carcasses that would otherwise be thrown away unsampled.

Anatomical collections.—No serious effort was made for building collections of anatomical specimens (skeletons, spirits) until the early 1980s. Other than some mounted skeletons constructed for display purposes, specimens were in the form of mounts and skins and then wings.

Spirit or alcohol holdings grew quickly once started, with initial efforts directed towards acquiring common species and small chicks not amenable to skinning. Owing to the late start of building this part of the collection, no space had been allocated in the Museum's alcohol specimen storage. Makeshift accommodation, undoubtedly quite illegal under fire regulations, was used, and this quickly filled, slowing the further development of spirit specimens almost to a halt. After several shifts of spirit containers, renovations to the spirit house allowed proper housing for the collection, although with almost no expansion room. Construction of a new Collections and Research Building in 2008 provided dedicated and correctly outfitted storage, and allowed for substantial growth. At present, there are slightly over 3,000 spirit specimens. One of the most important components comprises specimens acquired in the mid-1990s from New Guinea and several Pacific island groups (530 Papua New Guinea, 200 Solomon Islands, 50 Fiji, 50 Vanuatu, 55 Moluccas) during fieldwork made possible by funding to Tim Flannery. These were returned to the Museum in formalin and the decision to retain them as spirit specimens was based

on the absence of spirit specimens for these taxa in other world collections, whereas skins were well represented. They complement well a similar collection of 270 Papua New Guinea spirit specimens received in 1985 from Ken Aplin.

Preparation of osteological specimens began slowly with cold water maceration, but increased when a small colony of dermestid beetles (*Dermestes*, Dermestidae) was established. The space in which the latter was held was redeveloped for other Museum purposes, causing another hiatus. An existing gap under a stairwell, well away from collection areas, was sealed off and provided a suitable site for a productive colony. Unfortunately, several years of use were lost when this space was reallocated for the temporary quarantine holding of exotic tarantulas. When further renovations caused the loss of this area, another functional, albeit suboptimal, colony space was found. The slowest component in the process of building the osteology collection is the final cleaning of the specimens of the fine powdery waste of the beetles (frass) and any residual dried tissue. Fortunately, temporary staff have addressed this problem, at least in the short term, with a pleasing rate of skeleton incorporation into the collection, which now exceeds 3,000 skeletons and skulls.

Eggs.—Both Ramsay and North were intensely interested in eggs and each had his own private collection. Eventually, these came to the Museum, and served as the start for what would be a growing egg collection, currently numbering over 24,000 clutches. During Kinghorn's time, a number of confiscated egg collections were acquired by the Museum. In the 1800s and early 1900s, oology (the study of eggs) was considered a worthwhile and important aspect of the study of birds. Starting in the 1930s, however, there was a worldwide backlash against egg collecting. In Australia, this culminated with the banning of illegal collecting and was enforced by heavy-handed police raids on known collectors. Over-enthusiastic journalism was typified by the *Smith's Weekly*, dated 21 December 1935. In an article titled "Intrepid Anti-Birdnesting Squad Raids Scientists," the illustrations were captioned "Blood-thirsty bird's-nester caught red-handed in his den" and "Stirring scene when the intrepid Anti-Birdnesting Squad raids gang of ornithologists at their ghastly work." The writers made merry with accounts of collectors gathering to gloat over their nefarious acts.

In New South Wales, the confiscated collections were deposited in the Australian Museum, joining several earlier important donations that had been made before the raids took place. Foremost of the last were the collections of Thomas Phillips Austin (1874-1937) and William David Kerr Macgillivray (1867-1933), both well curated and notable for the extremely detailed data books accompanying them. Austin was a grazier from Cobborah Estate, Cobbyra, near Dubbo, NSW; his collection had almost 2,500 clutches. Macgillivray's collection, although smaller (1,850 clutches), was notable because it contained eggs acquired during his trip in 1914 to Cape York with William Rae Maclellan (1882-1935). This was the first major ornithological expedition to this area, and eggs of a number of species were obtained for the first time. The skins from this trip are held in the South Australian Museum and the catalogues in Museum Victoria.

Two intended donations were the collections of the honorary ornithologist, A. F. B. Hull (800 clutches) and of Ernest Arthur D'Ombra (ca. 1867-1944) (100 clutches), a Macquarie Street ophthalmic surgeon. D'Ombra influenced Maclellan, teaching him preparation, and introduced him to Macgillivray. Both collections had been destined for the Museum but, because of the premature confiscation, they arrived before anticipated. Less willing "donations" were the confiscated collections of a number of amateur oologists, including those of Launcelot Harrison (740 clutches), Sep Robinson (515), C. (Johnno) Rhodes (466), Charles G. Gibson (360), S. W. Moore (288), H. G. Bray (258), and Ernie Wood (187). These were not formally incorporated into the Museum at the time, instead being relegated to a warehouse, still in their original cabinets.

Several egg collections escaped the attention of the authorities but came to the Museum voluntarily in the 1980 and 1990s: Norman C. Fearnley (1,046), Alge Burge (525), and William D. Burns (415). One of particular value was built from the combination of the collection made by William J. H. Bettington, which itself included the George Savidge collection, with that of E. Lindsey Hyem (Bettington-Hyem Collection). This held 3,280 clutches, which included several rarities—Rufous Scrub-bird, several species of grasswren *Amytornis*—not previously represented in the Museum's holdings.

It was not until the 1980s that many of the collections were taken from their cabinets, rehoused and entered into the database. This work

was mainly the efforts of Wayne Longmore and Terence Lindsey, employed over several years on temporary funds.

Over 600 clutches were obtained by the Museum from the Australian Antarctic Expedition led by Douglas Mawson (1911-1914). A few skeletons, several of which were subsequently articulated for public display, and 95 skins were also received with the eggs. Biologists/collectors Harold Hamilton and Charles Francis Laseron were among the primary collectors for Mawson and Laseron's field notes for his specimens accompanied their acquisition by the Museum. As a nice complement to these, two mounted Emperor Penguins (*Aptenodytes forsteri*) collected by another Antarctic explorer, Sir Ernest Shackleton, during his 1914-1917 Antarctic expedition and given as rewards to his contributors, were donated to the Museum in 2010-2011.

Another smaller but important egg acquisition was the 128 specimens put together by the anthropologist Ralph Bulmer (1928-1988) while working in Baiyer River area of Papua New Guinea in 1960. Most of these are as yet unidentified, highlighting the poorly known nature of Papuan oology. The other part of Bulmer's collection is even more significant. He was studying the ethno-ornithology of the Kalam people of the Madang Province during 1955-1956. This work was done in close collaboration with Ian Saem Majnep (1948-), a Kalam man. In conjunction with the local folklore regarding the different birds, Bulmer collected specimens of many of the species. A number of these were prepared by his local colleagues and are interestingly rough in their final appearance. In all, 477 skins were acquired. The information gathered from his local informants was published in a book, *Birds of My Kalam Country*, co-authored with Majnep (Majnep and Bulmer 1977), and is now regarded as a classic in ethno-ornithology.

Both skins and eggs were acquired with the collection of Laurence Courtney Haines—later hyphenated to Courtney-Haines for effect (1920?-1996). Haines was an entomologist and ornithologist, with strong interests in hawkmoths and eggs, particularly those of reed-warblers (*Acrocephalus*) and relatives. His 265 skins and 280 egg clutches do not contain any great rarities, being mainly local species supplemented with a number of cage birds. His egg catalogue, written in a small school exercise book, makes interesting reading, if only for his often amusing comments towards others or the circumstances under

which a clutch was obtained. In one instance he deplores the “barbarian-like” handling of a clutch by another worker that left one egg broken. In another entry, he relates how, while on the way to choir practice (he was the local choirmaster) he spotted an active nest with newly laid eggs, noting to pick up the eggs on the way home. Once he snuck out after dark to acquire some eggs he had located, only to find that “an amorous couple” was directly below the tree. After retiring home for a short break and some scotch for fortification, he returned and successfully collected his target. Haines was a research associate of both the ornithology and entomology sections of the Museum. He was also the only Australian member of the British oological organisation, the Jourdain Society.

Nests.—The early interests of Ramsay and North in nests are almost solely responsible for the Museum’s holdings, which are about 1,100. These had been quite improperly housed in thin cardboard boxes with several nests squeezed into each. As a temporary respite from this, plastic ice cream containers were acquired through a request for donations to the local bird society. These containers, while not ideal in the long term, allowed the individual nests to be housed in a sturdy package that would protect against abrasion and crushing. The current project is to replace these containers, which deform over time and have inconvenient shapes for storage, with robust polypropylene sheet boxes that will not deteriorate, can be stacked, and are easily labelled.

Tissues.—The Museum was somewhat slow at entering the molecular age. The creation of frozen tissue collections lagged behind several other Australian collections, with facilities not becoming available for some years. Once the appropriate storage was acquired, with staff to manage the collection, the tissue representation has taken off. Within just a few years, it has exceeded 1,600 samples and is expanding rapidly. No one at the Museum currently accesses the tissues for systematic work, but there is regular use for air strike identifications, which are performed by the institution’s molecular lab staff.

Storage and moves.—Before Keast assumed the role of Curator, the bird specimens were stored in wooden cabinets (Figure 10). Keast began to acquire large metal cabinets for the collection. Empty, these

weighed 260 kg (= 480 pounds). With a complement of metal trays, they became much heavier. There were a number of drawbacks with these cabinets but probably the most significant resulted from the tendering process (calling for competing offers from different bidders) in place in the public service at that time. Since the cost of each cabinet and its trays was substantial, only a limited number could be acquired each year. Purchase requests above a certain amount were required to be put out to tender. This process had to be followed each year, with the unfortunate result that the same supplier did not always manufacture the cabinets in successive years. An outcome of this was cabinets and trays of slightly different widths co-existing in the collection and eventually becoming mixed. Despite efforts to outfit a cabinet with optimal sized trays, in many cases the disparities caused ongoing problems, particularly when combined with the slight bowing that some cabinets experienced. Most trays could be substituted between cabinets, but some would fit only a small number owing to their slightly greater or lesser width.

With the growth of the collection and competing demands for space within the Museum, the number of specimens outgrew space available in the collection area. Many were stored instead in 200 wooden drawers built into the base of the display cases in the public Bird Gallery. These had finicky locks and no environmental control or dust proofing other than often imperfect seals provided by the glass tops.

Mounted specimens not on display or otherwise in use were held in two sections of an offsite warehouse in a neighbouring suburb of Rushcutter's Bay. Very large study skins (e.g., albatrosses, ratites, swans) that could not fit in to the cabinets in the main area were held there. Other specimens located in the warehouse were the confiscated egg collections, still in their cabinets, the nest collection, and other miscellaneous items. Birds were not alone in this handling: specimens of other animal groups were also stored here. After some years, the specimens in the two areas were compressed into one to save rental costs, becoming essentially inaccessible. Eventually, it became necessary to shift specimens from this close but expensive location to a more distant but cheaper one. From what was walking distance now became a 20 minute drive to another suburb, Marrickville. The facilities themselves were markedly worse. There was no environmental control or insect proofing of any kind. Broken windows allow dust and soot—

the building was directly under a flight path near the airport—to accumulate on what was there. Any specimens that had not been previously placed in plastic bags were quickly secured. To make matters worse, closure of the bird gallery meant that the drawers full of study skins also had to be shifted. The drawers were moved, specimens still inside, to the offsite storage and stacked in piles. The next relocation was to a warehouse in Homebush Bay, lengthening travel time to about an hour, with no appreciable improvement in the quality of the surroundings.

Yet another move was a considerable improvement. These collections are now in Alexandria, a relatively easy 15 minute drive away. Collections are located in several sections of the building. The eggs, nests, and study skins occupy a former office section, which has some environmental control and relatively good (but failing) seals. The mounts live in a warehouse section that has all the faults of its predecessor. At present, efforts are being made to return specimens to the main collection area whenever possible.

In 1991, the skin collection moved from its space on the ground floor of the main Museum building to an adjacent building, the former National School Building or William Street Girl's School. This space had very good environmental control, but was still not an ideal collection area. More problematic was the move. The Museum engaged a team of professional movers to shift the collection in as short a time as possible. Trays, with the specimens within, were removed from the cabinets, and both cabinets and trays were moved to the empty space, but not in concert. The first cabinet to arrive was placed in the furthest corner and was filled with the first trays to be shifted. This process continued for the entire move, which took three days. Unfortunately, the sequence that cabinets and trays were placed in the new facility was not the same as in the old one. The result was that the collection was largely randomised and required about two years to get back into suitable order. Whatever savings higher management had made on the move itself was lost on the wages of temporary staff and volunteers to rectify the problems it had created.

The collection area was slightly expanded with the renovation of a previously unusable corner of the space. Nonetheless, space limitations proved a major hurdle and it was soon not possible to incorporate many newly acquired specimens into their appropriate cabinets. Several overflow cabinets were established to accommodate this material.

Fortunately, a new collections building was constructed on site, opening in late 2008. The collection move this time was carefully planned and executed over nine weeks, freezing all specimens before the shift, with a far more pleasing outcome than the previous one. Existing cabinets, structurally troublesome and filled to capacity, were replaced with rolling style storage units. This increased the available space and had room for another 50% expansion in shelving. The rooms were environmentally controlled with positive pressure to reduce dust and insect incursions.

It also provided space for the return to the main building of many of the important large study skins that previously could not be housed in then existing facilities. Rather than cabinets, which were used for smaller specimens, open racking on moving bases was installed in one of the collection spaces. A substantial majority of the large skins, and all of the most important ones, were returned to the main collection. In addition, the expansion room allowed the ongoing reincorporation of the offsite overflow of smaller skins. Some mounts have been boxed and brought back. Many of the mounts, as well as the eggs and nests, remain at offsite storage, and it is unlikely that these will join the main collection any time soon.

The Great Theft.—What is certainly one of the most disheartening and traumatic episodes in the history of the Museum were the thefts of specimens from the bird, mammal and, to a lesser extent, reptile collections. In late 1996, the Museum “appointed [Hendrikus (Hank)] van Leeuwen in a temporary capacity to the position of Assistant Conservator, a position that largely involved controlling insect pests in the Collections” (ICAC 2003, p. 10). The role of pest control officer allowed him unaccompanied after hours access to collection areas, both in the main building and at offsite storage. Van Leeuwen had an interest in maintaining a private collection, and in moulding and casting of skulls, some of which he sold. Initially, he targeted some larger skulls and more spectacular skins. This brought the thefts to attention not soon after the first were taken, but provided no clues to the person responsible. These high profile items also drew attention away from more common taxa that had also been taken from larger series. Unopened loan returns from the mail room and frozen bodies from Taronga Zoo intended for the Museum were also taken. A tightening of access to certain areas meant his activities were increasingly curtailed,

but his increasing obsessiveness for stealing specimens caused him to take whatever he could. By this time suspicion had fallen on van Leeuwen, but no evidence could be found to justify action against him. Early efforts to involve the police had not proved successful. A complaint from an outside researcher to the head of the Museum's Trustees led to the investigation being conducted by the Independent Commission Against Crime (ICAC), a body established to probe crime in government workplaces. A chance event permitted an inspection of the house of a friend of van Leeuwen. Here a Museum specimen was found and the person named van Leeuwen as the person from whom it was obtained. A subsequent raid on van Leeuwen's home recovered about 2,000 specimens from the various animal groups. It was found that he had removed labels from specimens and actively obscured registration numbers written on skulls. Fortunately for the bird collection, a bag was found containing the skin labels he had removed. These were cross referenced to the skins with his own number, which made repatriation of many specimens straightforward. For some, however, he had taken several specimens from a series and removed the number from the labels. These and others are unlikely to ever be re-identified with surety to particular specimens, and can only be cited as one of several possibilities. Surrender of his personal register, which would have greatly assisted in identifying specimens, was not forthcoming on the claim that it had been lost. Events surrounding the whole episode were controversial from several parties' standpoint. A public report on the findings was published (ICAC 2003), presenting additional information on the case, but many aspects of this episode have never appeared in print and are unlikely to do so owing to potential litigation by some participants.

EXHIBITIONS

From the beginning, displays comprised little more than mounted birds on perches. Other than for names on labels, there was little or no additional information. These mounts were crammed into display cases, with no themes, a mix of Australian and foreign species. Another feature (of dubious audience interest) was an array of small wooden plaques, each with the mounted sternum and shoulder girdle of a different species, no doubt the leftovers from a bird otherwise prepared.

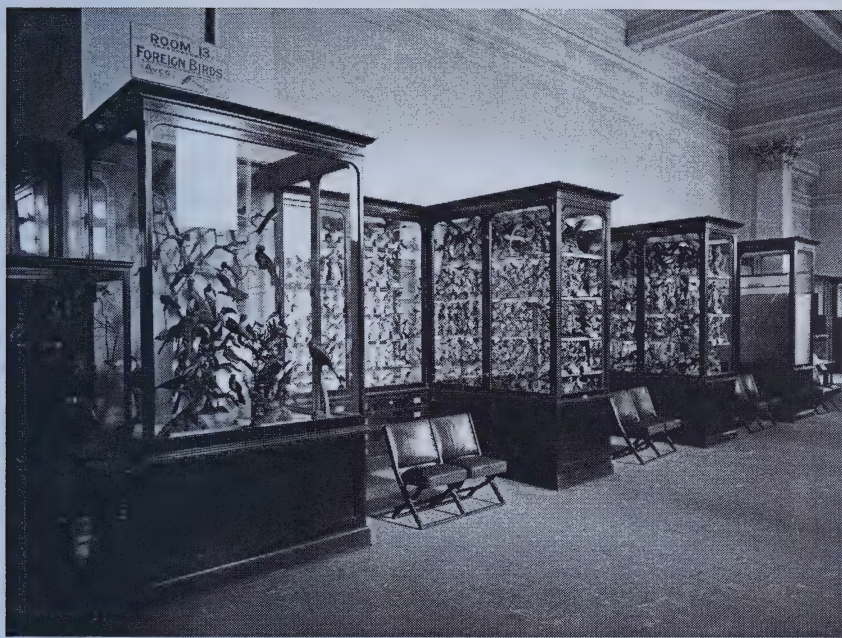


Figure 19. Old bird gallery, about 1950, little changed in layout or content since Krefft's tenure. Courtesy Australian Museum Archives AMS351 V11020.

Krefft started the Museum's push away from being just a place of curiosities for the amusement of visitors by developing research collections. This new direction did not extend to the public galleries, however, and the crowded cases continued through his time until the 1950s. Under a new Director, John Evans, a complete revitalisation took place.

The bird gallery, with mounted birds and little interpretive text, was located on the first floor (Figure 19). Under Evans, a new bird gallery on the second floor was constructed in 1956-1957. The majority of the non-Australian content was removed, as were 80% of the specimens. Instead, much more biological information on natural history aspects was incorporated. Most was conveyed through conventional text on wall accompanying specimens, but an unsuccessful attempt was made to illustrate bird flight with a moving

mechanism. The graphics, state of the art when installed, were well dated by the 1970s. A new gallery was opened in 1980, this time on the mezzanine, a large doughnut shaped area surrounding an open space extending from the ceiling to the ground floor, fitted out with tall, but shallow wall cases. This physical layout restricted what could be done, so that other than a few introductory panels on bird biology, the content reverted to a traditional "birds on perches" presentation with little text. Species were restricted to those that occurred in Australia and were arranged in family groupings. Many of the specimens from the previous gallery were reused. Some were showing their age, particularly in regard to fading from excessive exposure to light. Other mounts were newly made for display. The highlight was the Night Parrot, one of only 24 specimens of this species then known. The exhibition plan at the time was to replace galleries every ten years or so. While this timetable was more or less adhered to with the renewal of most galleries elsewhere in the Museum, the restricting physical setting of the mezzanine seems to have discouraged any renovation of the bird gallery and it remains with little alteration more than 30 years after being opened.

Elsewhere in the Museum, many birds are in use in temporary and semi-permanent displays. This is particularly so in public education, with staffed touch tables in public areas and with a smaller collection in Search & Discover, the Museum's public resource centre.

TERRESTRIAL ECOLOGY

Frank Talbot, Museum Director, established a Department of Environmental Studies at the Museum in 1968. Harry F. Recher (1938–) was lured from the University of Sydney, where he had arrived as a Lecturer in Zoology from the United States in 1967 to Head the new department. Recher, Graham Pyke, and Richard Major, subsequent research staff in Environmental Studies (later called Terrestrial Ecology), had strong interests in birds and carried out wide-ranging studies of avian ecology and behaviour, which still continue. A history of this Department has been written by Recher and Pyke and appears in this volume. It should be consulted for details.

NATIONAL PHOTOGRAPHIC INDEX

The National Photographic Index of Australian Birds was founded in 1969 to assemble a photographic representation of all species of Australian birds. This was the brain child of Alfred Donald Trounson OAM (Medal of the Order of Australia) (1905-2009), a former British diplomat and amateur photographer. His last posting had been to Canberra and after retirement, he settled in Australia. Trounson served as the head of Index until 1981, when he was followed by Ronald Strahan AM (Member of the Order of Australia) (1922-2010).

Initially the Index was conceived as a scientific resource, with submitted images judged on scientific value, technical quality and artistic appeal; in the first ten years around 20,000 bird photographs were submitted. The Index later expanded to have a less scientific emphasis and a more broadly artistic basis (while not discarding its original goal). The name was subsequently changed to the National Photographic Index of Australian Wildlife when the collection was expanded to incorporate mammals and then reptiles and frogs. The modern collection was supplemented by donations of 10,000 early glass lantern slides and black and white prints. These were catalogued by John Disney after his retirement, amateur ornithologist Jack Waterhouse, and Museum Research Associate Edwin (Ted) Lyon Carthew (1910-2003). Carthew was Honorary Archivist (Historical) for the Index and served as a councillor for the RAOU.

Several extensive trips were organised to find and photograph particularly poorly represented bird species. The first was to Iron Range, on Cape York Peninsula, Queensland, and the second to the Simpson Desert in search of the Eyrean Grasswren (see under account for H. J. Disney). Trounson and his colleague, Molly Clampett, devised a portable photographic studio for use in the field. A bird could be captured, placed into the studio and then photographed under controlled conditions.

The first major publication based on the Index was *The Reader's Digest Complete Book of Australian Birds* (1976). This was followed by *The Complete Book of Australian Mammals*, a volume with similar format (Strahan 1983), and the *Photographic Field Guide: Birds of Australia* (Flegg 1995). Trounson came up with the idea of having a series of extensively illustrated books to cover all of Australia's birds

and be the photographic equivalent of John Gould's *Birds of Australia*. This was produced in ten volumes from 1982 to 1996, the first two volumes being edited by Vincent Serventy, the last by Strahan, assisted by Terence Lindsey. A variety of authors were engaged to produce the text. A change in publisher during the final volumes saw a reduction in the number of photographs included for each species and general diminution of resources directed to the series.

Together with Clampett (later Molly Trounson, whom he married after becoming widowed), Trounson published several books, including several editions of *Australia, Land of Birds* (Trounson and Trounson 1987). "For [his] service to the community as creator of the National Photographic Index of Australian Birds," Trounson was awarded an OAM in 2003. He died at the age of 103.

The Index had been set up under a trust in cooperation with the National Library of Australia. In late 1980 the trust was dissolved and the Index became a formal part of the Museum. After the publications had been achieved, the Museum made the collection more of a photographic agency and changed the name to Nature Focus. In 2005 this was disbanded and photographs, other than those for which the Museum held or shared copyright, were returned to the owners.

THE FUTURE (IF ANY)

This history is far from complete. Other than anecdotes gleaned from some of the people discussed within, it has depended on information already published. Much of the early history comes from Strahan (1979), who relied on Etheridge (1916) for some of the correspondence, while information on individual workers was heavily reliant on entries in the *Australian Dictionary of Biography*, now available online, which complement and extend information in earlier printed works, the most notable of which are Whittell (1954) and Mathews (1925).

The present account should be considered an introduction into the development of ornithology at the Australian Museum and of those people involved in this endeavour: Yet, there is a virtual mine of material that awaits someone to fill in details and shed light on overlooked events. Cahill (1998) has done an admirable job in producing a narrative of A. J. North's life by consulting his unpublished

papers and letters. Other Museum ornithologists have left similar collections, inviting someone to investigate these and extend their legacies. The Archives in the Australian Museum contain a host of material, as does the Mitchell Library, Sydney. The latter contains Ramsay's papers, which warrant such attention.

Less clear is what the future situation will be in ornithology at the Museum. With Boles' retirement in early 2012, there may be a return to the lean years. Sladek continues as Acting Collection Manager, however, indications are that the position of dedicated ornithological Collection Manager, much less research ornithologist, will not be filled. It seems all too likely that singleton staff will be charged with maintaining the collection, with greatly reduced collection building, while research will cease other than by visitors and retired curators and collection managers. A recent reduction in preparation staff support considerably exacerbates the situation. Like ornithology at an increasing number of museums, that at the Museum risks becoming a victim of reduced State budgets, competing demands for funding within the institution, and bureaucrats who do not properly understand the role of natural history museums, as places of both collections and research; seemingly, they do not appreciate the long history of these enterprises in the Museum. After 180 years, this is a shame, with long-term consequences not only for the science of ornithology, but for the Australian avifauna desperately in need of much more vigorous conservation management.

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A History of Ornithology at Canterbury Museum

R. Paul Scofield¹

ABSTRACT.—The history of ornithology at Canterbury Museum is traced through five phases in the Museum's development: (1) the era of Julius Haast's tenure as Director (1868-1887), (2) the era of Frederick Hutton (1887-1906), (3) the financially insecure era of Speight, Waite, and Falla (1906-1947), (4) the financially secure Roger Duff/ Ron Scarlett years (1947-1978), and (5) the recent years under the directorship of Michael Trotter and Anthony Wright (1978 to present). During Haast's and Hutton's times and, during the brief tenure of Robert Falla, the bird collection was enhanced by major exchanges of specimens with local and foreign institutions. As a result of the 1954 Wildlife Act, collecting in recent years has been by salvage only. The collection now numbers approximately 40,000 avian specimens. The bird gallery in the 1870 building served for 80 years. Its replacement, in the 1950 extension, contains large and superb dioramas and has remained open, with a refurbishment in 1990. Staff in charge of the bird collections have included J. F. Haast, F. W. Hutton, G. A. Archey, R. A. Falla, E. G. Turbott, R. J. Scarlett, G. A. Tunnicliffe and most recently R. P. Scofield, all of whom have published and researched actively in ornithology. Taxidermists who have prepared specimens for the collection include E. Fuller, A. Reischek, and members of the Jacobs family.

JULIUS VON HAAST AND THE FOUNDING OF CANTERBURY MUSEUM

The story of the founding of Canterbury Museum is inexorably tied up with the story of Julius Haast's rise to prominence in Victorian scientific society in New Zealand.

Sir Johann Franz (Julius) von Haast (1822-1887).—Born in Bonn, the early life of Julius Haast is shrouded in mystery and recent

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research into his background has made his provenance even murkier. Although he often stated that he was enrolled at University in Bonn, the University has no record of his enrolment (Langer 1992). We do know that he completed a two-year commercial apprenticeship and was a partner in a business dealing in flowers and fabrics until it failed in 1850. He was on friendly terms with the famous mineral dealer August Krantz in Freiburg and probably dealt in minerals and books until 1858 when, his son (Haast 1948) states, he was recruited by the British shipping company, Willis, Gann and Company to investigate the potential of German emigration to New Zealand. Haast's son by his second marriage (Haast 1948) recorded that his father, at the time of his emigration in 1858, was a widower, but records show that his wife, Antonia Haast, died in October 1859 (Barton 2000).

Julius Haast arrived in Auckland on 21 December 1858. The date of his arrival was fortunate, as geologist Ferdinand Hochstetter arrived the following day aboard the *Novara*, and Haast was able to ingratiate himself into Hochstetter's party, making geological trips to the Auckland and Nelson areas. After Hochstetter left in 1859, Haast worked for the Nelson provincial government, exploring the western parts of the province, and looking for mineral deposits. In December 1859, Haast suggested to the Canterbury provincial government that he should continue his geological survey into Canterbury. While he was waiting for this to be decided he was asked to check the site where the Lyttelton Tunnel was to be excavated through the Port Hills. The contractors had given up when they struck harder rock than expected, but Haast was able to back up the provincial engineer's report on the type and amount of rock the tunnel builders would come across, and the tunnel went ahead. Haast was made Canterbury's provincial geologist in February 1861 (Figure 1).

He became a British subject and married Mary Dobson, daughter of the provincial engineer Edward Dobson, and sister of the surveyor Arthur Dobson. He surveyed Canterbury and mapped where it was likely that minerals would be found. He made trips up the main rivers of Canterbury to their sources and explored the area around Mount Cook, and parts of the West Coast. Haast had begun a small museum collection in 1861, and this was stored in a room in the provincial council buildings and officially opened for public view on 3 December 1867. Given the precedent of Auckland Museum (Gill 2008) it is from this date we should probably date the foundation of Canterbury



Figure 1. Julius Haast shortly after his arrival in New Zealand about 1859. Unknown photographer. [Canterbury Museum Accession no. 19XX.2.2082]

Museum. In July 1862, Haast founded the Philosophical Institute of Canterbury. The Institute was a great success and supported Haast's goal of a museum for Canterbury. In 1865, a large collection of moa bones in very good condition was found in a swamp at Glenmark Station. Haast exchanged complete skeletons with museums and collectors overseas, building a reputation for the Canterbury Museum, and getting specimens for the museum collection in exchange. An, apparently exhaustive, bibliography is contained in the appendixes to his sons biography (Haast 1948:1088-1100). Haast was appointed

director of the museum in 1868 and set about raising funds for a purpose-designed building. Funding for the Museum came from a public appeal and a grant from the Provincial Government. Plans for the building adjacent to the Botanic Gardens designed by Benjamin Mountfort, were accepted and a tender notice placed in *The Press* in February 1869. The two-storey building in the Gothic Revival style was a single room 21.3 m long by 10.6 m across, containing a gallery supported by New Zealand Kauri (*Agathis australis*) columns and contained a small office for Haast and his sole staff member, Frederick Fuller, a taxidermist. The exterior was of grey basalt from the Halswell Quarry, with a stone entranceway to the east and a small, one story annex to the west for the staff. The building was officially opened on 1 October 1870 (Figure 2). At the time of opening, the museum contained 25,353 specimens, the majority of which were on display. Of these, 11,218 were zoology specimens and 733 skins of birds (Haast 1881). As the collection grew, so did the museum. Additions were made in 1872 (Figures 2 and 3), 1876/1877, and 1882, bringing the size of the

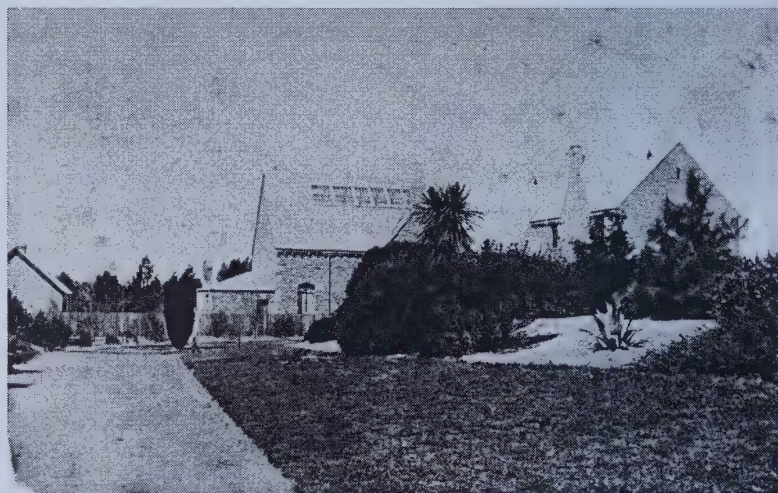


Figure 2. One of the earliest surviving photographs showing the 1870 building on the left and the extension added in 1872. Both were designed by Benjamin Mountfort. [Canterbury Museum Negative no. 5660]

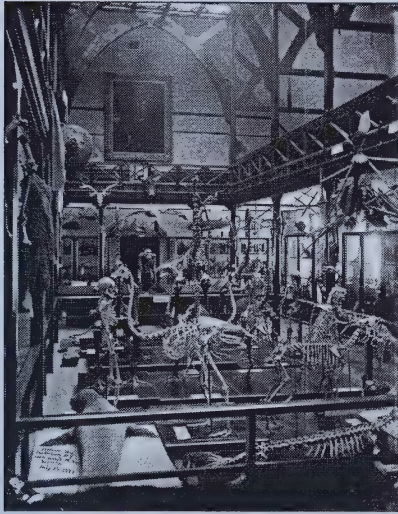


Figure 3. The main gallery (now the Mountfort Gallery) of Canterbury Museum shortly after the opening of its south wing. Taken on July 22, 1872 by A.C. Baker. [Canterbury Museum Accession no. 1944.78.213]

museum up to 40,000 square feet. By 1885, Canterbury Museum was regarded as the best in the Southern Hemisphere, and by 1895 it was rated in the top twenty in the world.

Haast supported moves to set up Canterbury College as part of the University of New Zealand. He taught courses in geology and palaeontology, and became the first professor of geology in 1876. Amongst other honours, Haast was awarded a gold medal from the Royal Geographical Society in 1884 for his work on moa. Unlike many of his colleagues, much of Haast's work on moa has stood the test of time. It was he who erected two of the six genera we recognise today (Tables 1 and 2) and he only erected two species that were subsequently synonymised (compared for example to Hutton's 18 subsequently synonymised species and 3 subsequently synonymised genera).

Table 1: New Zealand Bird taxa named by Sir Julius von Haast

Common Name	Scientific Name	Date	Notes	Type
Little Bush Moa	<i>Dinornis oweni</i>	1886	A synonym of <i>Anomalopteryx didiformis</i> (Owen)	AIM AV384
Eastern Moa	<i>Meionornis</i>	1874	A synonym of <i>Emeus</i> Reichenbach	N/A
Stout-legged Moa	<i>Euryapteryx</i>	1874	Valid	N/A
South Island Giant Moa	<i>Dinornis maximus</i>	1869	A synonym of <i>Dinornis robustus</i> Owen	AV8988, AV8788 & AV8975
Haast's Eagle	<i>Harpagornis moorei</i>	1872	Valid	Av5104
Haast's Eagle	<i>Harpagornis assimilis</i>	1874	A synonym of <i>Harpagornis moorei</i>	AV5102

Table 2. New Zealand Bird taxa named after Sir Julius von Haast.

Common name	Scientific Name	Author
Upland Moa	<i>Palaeocasuarius haasti</i>	Rothschild – A synonym of <i>Megalapteryx didinus</i> (Owen)
Stout-legged Moa	<i>Emeus haasti</i>	Rothschild – Synonym of <i>Euryapteryx gravis</i> (Owen)
Great Spotted Kiwi	<i>Apteryx haastii</i>	Potts - Valid
Haast's Eagle	<i>Harpagornis moorei</i>	Haast - Valid
North Island Laughing Owl	<i>Strix haasti</i>	Buller - Synonym of <i>Sceloglaux albifacies albifacies</i> (G. R. Gray)
Rock Wren	<i>Xenicus haasti</i>	Buller - Synonym of <i>Xenicus gilviventris</i> Pelzeln

Frederick Richardson Fuller (1830–1876).—Born in Suffolk, England about 1830, Frederick Fuller trained as a taxidermist and emigrated to South Australia in 1849. In South Australia, he worked as a farmer and later a hotelkeeper. He married in 1859, and in 1862 moved to New Zealand at the peak of the gold rush. By May 1863, he had made a modest amount of money on the goldfields, for he had given up on mining and purchased an unassuming little house in the suburb of Mornington in Dunedin. There Frederick “set up the collection of New Zealand birds for the Otago Government” (J. Haast in Greenaway 1994). This is presumably the foundation collection of Otago Museum. In 1865, Frederick left Otago to work for Haast as a taxidermist on a short term contract. He set up a workshop in a small room on the second floor and north-eastern corner of the provincial council chambers. This workshop and the adjacent larger room housed a developing museum which included gifts from local naturalists and landowners and the skins of rare birds which Haast had gathered from throughout the colony. Between August and Christmas, Fuller had prepared over 100 specimens and due to his industry Haast was successful in finding more money for a more permanent contract. The next few years were the best of Fuller’s life, as he accompanied Haast on expeditions throughout the South Island and amassed a large collection of skins which Haast traded throughout the world (Burrage 2003).

Unquestionably Fullers most significant scientific discovery was that of the giant eagle *Harpagornis* in late March 1871 at Glenmark Station, north of Christchurch (Figure 4). It is unfortunate that this species now goes by the name of Haast’s Eagle as it was Fuller who concluded that these bones belonged to a gigantic raptorial bird which preyed on moa (Haast 1874).

Unfortunately Frederick was probably a manic depressive and alcoholic. In July 1876, Haast fired him for being drunk at work. In a fit of depression, he consumed arsenic and on 28 July died. Frederick left a wife, Mary, and five young children and at Haast’s insistence the Canterbury College’s Board of Governors granted his wife two months of her husband’s salary. Haast even subdivided a piece of his own estate to give Mary a place to live (Greenaway 2004).



Figure 4. Julius Haast (sitting) and museum preparator Frederick Fuller in A. C. Barker's garden. Bones of *Dinornis robustus* held by both men are generally attributed to the Glenmark excavation suggesting the photo was taken in late 1866 or early 1867 following the first large excavation at this site. A. C. Barker photographer. [Alexander Turnbull Library Accession no. PAColl-5381-0]

HUTTON'S TENURE AS DIRECTOR

Henry Ogg Forbes (1851–1932).—Forbes succeeded Haast and had a brief but controversial reign. Forbes was educated in Scotland but owing to the accidental loss of an eye he was compelled to abandon a medical career shortly before he should have qualified. Forbes carried out a series of hugely unsuccessful private expeditions to the Moluccas and New Guinea between 1878 and 1883. He was appointed to the

Table 3: New Zealand species named by Henry Forbes

Common name	Scientific Name	Date	Details
Extinct New Zealand Swan	<i>Chenopsis sumnerensis</i>	1890	A synonym of <i>Cygnus atratus</i>
New Zealand Cape Barren Goose	<i>Cereopsis novaezealandiae</i>	1892	A synonym of <i>Cnemiornis calcitrans</i> Owen
North Island Goose	<i>Cnemiornis gracilis</i>	1892	Valid
South Island Goose	<i>Cnemiornis minor</i>	1892	A synonym of <i>Cnemiornis calcitrans</i> Owen
New Zealand Musk Duck	<i>Biziura delautouri</i>	1893	Valid
New Zealand Black Shag	<i>Phalacrocorax novae-zealandiae</i> var. <i>major</i>	1892	Homonym of <i>Pelecanus major</i> Ellman, 1861.
Chatham Island Shag	<i>Phalacrocorax onslowi</i>	1893	Valid
Chatham Island Shag	<i>Phalacrocorax rothschildi</i>	1893	A synonym of <i>Phalacrocorax onslowi</i> Forbes
Eyles' Harrier	<i>Circus teauteensis</i>	1892	Valid
Eyles' Harrier	<i>Circus hamiltoni</i>	1892	A synonym of <i>Circus teauteensis</i> Forbes
Buff Weka	<i>Ocydromus insignis</i>	1892	A synonym of <i>Gallirallus australis hectori</i> (Hutton)
Chatham Island Rail	<i>Ocydromus pygmaeus</i>	1892	A synonym of <i>Cabalus modestus</i> (Hutton)
Hawkins' Rail	<i>Diaphorapteryx hawkinsi</i>	1892a and c	Valid
South Island Takahe	<i>Notornis parkeri</i>	1892	A synonym of <i>Porphyrio hochstetteri</i> (A. B. Meyer)
Chatham Island Coot	<i>Palaeolimnas chathamensis</i>	1892, 1893	Now considered <i>Fulica chathamensis</i> (Forbes)
Forbes' Snipe	<i>Gallinago chathamica</i>	1893	Now considered <i>Coenocorypha chathamica</i> (Forbes)
Chatham Island Raven	<i>Palaeocorax moriorum</i>	1892a and c	Now considered <i>Corvus moriorum</i> (Forbes)
North Island Raven	<i>Palaeocorax antipodum</i>	1893	Now considered <i>Corvus antipodum</i> (Forbes)

Table 4: New Zealand species named in honour of Henry Forbes

Common name	Scientific Name	Author
Forbes' Parakeet	<i>Cyanorhamphus forbesi</i>	Rothschild
Forbes' Snipe	<i>Gallinago chathamica</i>	Forbes

curatorship of Canterbury Museum in 1889 following extensive advertisement overseas. In his short time in New Zealand (3 years) he contributed significantly to the study of our extinct Quaternary avifauna, describing 20 taxa of extinct birds (Forbes 1892a,b and Tables 3 and 4). Between 21 January and 16 February 1892, he was the first scientist to visit the Chatham Islands since Dieffenbach had in 1839 and it was here that he made his most valuable discoveries (Forbes 1893).

Following dissatisfaction with his reimbursement at the Museum and accusations of inappropriate dealings, primarily by Frederick Hutton, he moved back to Liverpool, England, where he served as Consulting Director of Museums. His departure with the type material of all his New Zealand species antagonised scientists in New Zealand and led to accusations of theft. He continued to take part in expeditions, somewhat more productively than those of his early career, making successful trips to Socotra and Peru. Forbes was always an awkward and contentious character. Typifying this awkwardness, his obituary in *The Ibis* states that he was a member of the British Ornithologists Union till 1918, "when an unfortunate difference of opinion with the Committee of the Union obliged him to resign" (Sclater 1933:136).

Captain Frederick Wollaston Hutton (1836–1905).—Born in Lincolnshire, Hutton studied applied science at King's College, London, before being commissioned in the Royal Welch Fusiliers and fighting in the Crimean War and the Indian Mutiny. He returned to England in 1860, and continued to study geology at Sandhurst, being elected to the Geological Society of London in the same year. In 1861, he reviewed Charles Darwin's *The Origin of Species* for *The Geologist*, and throughout his life, Hutton remained a staunch exponent of

Darwin's theories of natural selection. Darwin himself expressed his appreciation in a letter to Hutton.

Hutton resigned his commission in 1866 in order to travel with his wife and two children to New Zealand, where four more children would follow. They lived initially in the Waikato, where Hutton tried his hand at flax milling, but he soon changed back to geology, joining the Geological Survey of New Zealand in late 1866. He was for a brief time in 1867 associated with Auckland Museum, having charge of the collections and arranging them in the new premises that are now the Northern Club (Park 1999). He became Provincial Geologist of Otago in 1874. At the same time, he was made Lecturer in geology at the University of Otago and Curator of the museum there. Hutton became Professor of Biology at Canterbury College in 1880, and was elected a Fellow of the Royal Society in 1892. Hutton acted as temporary Director of Canterbury Museum between the death of Haast in 1887 and the arrival of Haast successor Forbes in December 1888. Following Forbes departure in 1893, he took on the curatorship of the Canterbury Museum in combination with his duties at Canterbury College (Dawson 1994; Figure 5).

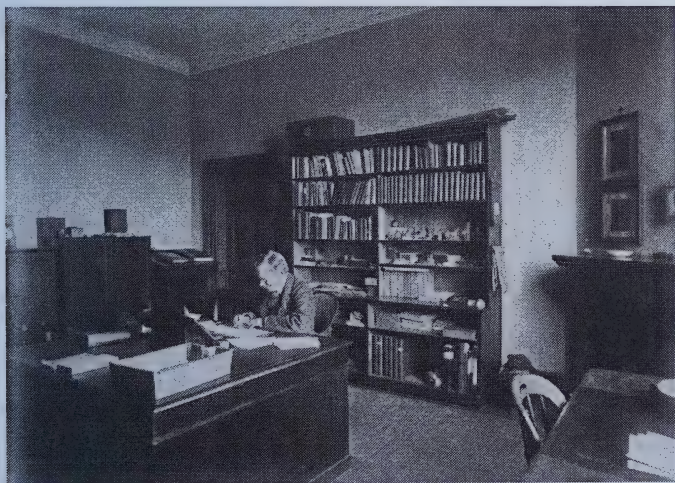


Figure 5. Captain Frederick W. Hutton in the Director's office, Canterbury Museum; Unknown photographer [Canterbury Museum Accession no. 19XX.2.4988].

He was a major influence on the study of New Zealand’s avifauna. Like all his contemporaries he made several forays into moa taxonomy which were unfortunately of dubious value at the species level but he was the first to recognize the currently accepted generic taxa (Hutton 1892, 1897) (Tables 5 and 6). He co-wrote an important book that made information on local birds accessible to the public (Hutton and Drummond 1904). Hutton was elected a Fellow of the Royal Society (London) in 1892. Towards the end of his life, Hutton was made President of the Royal Australasian Ornithologists Union and the New Zealand Institute. (Dawson 1994).

Table 5: Bird species named by Frederick Hutton during his tenure at Canterbury Museum.

Common name	Scientific Name	Date	Details	Types
Little Bush Moa	<i>Anomalornis</i>	1897	Unnecessary <i>nomen novum</i> for <i>Anomalopteryx</i> Reichenbach, 1897	N/A
Ancient moa remains	<i>Anomalopteryx antiquus</i>	1892	Probably synonym of <i>Anomalopteryx didiformis</i> (Owen)	AV9546, AV10176 (cast)
Little Bush Moa	<i>Anomalopteryx fortis</i>	1893	Synonym of <i>Anomalopteryx didiformis</i> (Owen)	AV8814
Little Bush Moa	<i>Anomalornis gracilis</i>	1897	Synonym of <i>Anomalopteryx didiformis</i> (Owen)	Not Found

Hutton died on a return sea voyage from England on the 27 October 1905, and was buried at sea off Cape Town, South Africa. He is commemorated in the Hutton Memorial Medal and Research Fund, awarded for scientific works bearing on the zoology, botany or geology of New Zealand. A complete bibliography can be found in Dawson (1994:25–81).

Table 6: New Zealand species named in honour of Frederick Hutton

Common name	Scientific Name	Namer
Eastern Moa	<i>Dinornis huttoni</i>	Owen – Synonym of <i>Emeus crassus</i> (Owen)
Light-mantled Sooty Albatross	<i>Phoebastria palpebrata huttoni</i>	Mathews - Synonym of <i>Phoebastria palpebrata</i> (J. R. Forster)
Fairy Prion	<i>Pseudoprion turtur huttoni</i>	Mathews - Synonym of <i>Pachyptila turtur</i> (Kuhl)
Hutton's Shearwater	<i>Puffinus huttoni</i>	Mathews - Valid
Stewart Island Shag	<i>Phalacrocorax huttoni</i>	Buller - Synonym of <i>Leucocarbo chalconotus</i> (G. R. Gray)

THE TENURE OF EDGAR WAITE, ROBERT SPEIGHT, AND ROBERT FALLA AS DIRECTORS

In his epic *Life and Times of Julius von Haast* (Haast 1948), Julius's son Heinrich considered that the people of Canterbury during the era of Waite and Speight allowed Canterbury Museum to "moulder away." Whether this is fair has been debated, but it is certainly true that resources were at a premium during this period and that both directors did not have the breadth of knowledge nor interest of their illustrious predecessors in ornithology. From the point of view of the ornithology collections and displays, nothing significant occurred throughout the tenure of Waite and Speight and it was only after the appointment of Falla in 1937 that the ornithology collections received any substantial curation.

Edgar Ravenswood Waite (1866–1928).—Born in Leeds, England, Waite received his scientific education at the Victoria University of Manchester, and in 1888 was appointed Sub-Curator of the Leeds museum. He was soon afterwards made Curator, but in 1893 became Zoologist at the Australian Museum, Sydney (Serle 1949). His first interest had been ornithology, but later became more interested in fish

and reptiles. In 1906 he became Curator of Canterbury Museum (Figure 6), and during his tenure wrote numerous papers on the fishes of New Zealand. As primarily an ichthyologist during his tenure, the ornithological collections (and indeed ethnographic and social history collections) were somewhat neglected. In 1907, he was with the Canterbury Philosophical Institute's expedition to the sub-Antarctic

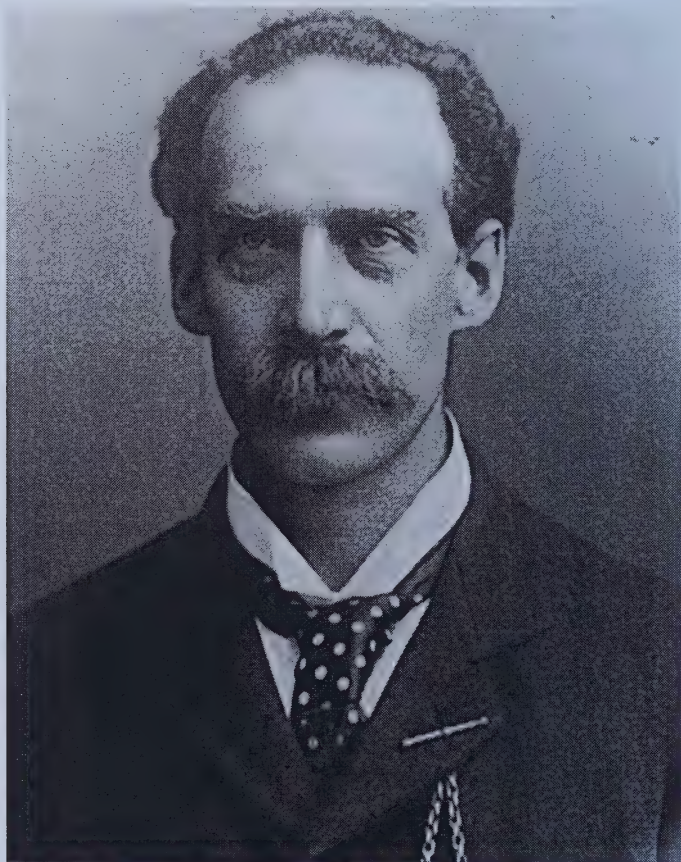


Figure 6. Edgar Waite shortly after he started working at Canterbury Museum. [Canterbury Museum Accession no. 1923.53.546].

islands. He was zoologist on the *Aurora* in 1912 during the first sub-Antarctic cruise of the Mawson expedition and a number of birds collected during this period are found in the collections. Waite left Canterbury Museum in 1914 to take up the position of Director of the South Australian Museum under the patronage of Sir Douglas Mawson (Serle 1949).

Robert Speight (1867–1949).—Robert Speight was born in Stockton, Durham, England, the son of a teacher, James. The family emigrated to Canterbury, New Zealand, when Robert was about 12 years old. His father taught at Tai Tapu, 10 miles south-west of Christchurch, and was later Headmaster of St Albans School in

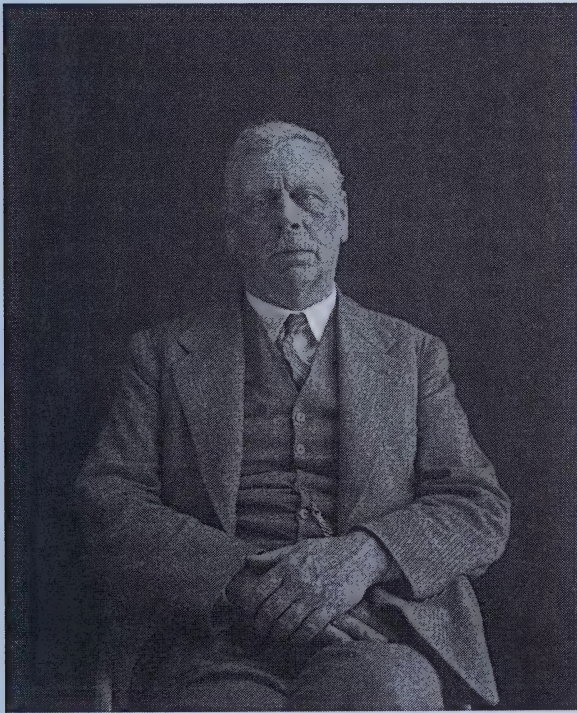


Figure 7. Professor Robert Speight. Unknown photographer. [Canterbury Museum Accession no. 19XX.2.4995]

Christchurch. Speight attended Canterbury College (later the University of Canterbury). He learned science part time (while teaching) under Hutton, graduating with a BSc in 1891. In 1903, after Hutton retired, Speight took over the geology courses at Canterbury College, and taught there continuously for the next 27 years. In 1908, two years before he graduated from Canterbury College with a MSc, he was appointed to the Canterbury Museum as Assistant Curator and in 1914, following Waites' departure, became Curator (Figure 7), a position he retained until retiring in 1935 (Gage 2010). A geologist by training, Speight had responsibility for the running of the Canterbury Museum as well as university teaching and geological research. He struggled to keep the institution alive as it languished from lack of money, staff, and civic support. Probably as a result of his early teaching experience, Speight was popular and could communicate well with the public. Correspondence of the time in the Canterbury Museum Archive is full of praise for the way he always found time to answer questions or identify specimens brought in by visitors. He gave public lectures, wrote popular articles in *The Press* and contributed substantially to the widely read *Natural History of Canterbury*, published in Christchurch in 1927.

Sir Gilbert Edward Archey (1890–1974).—Archey was one of Speight's first appointments as Curator and was the first person appointed Zoologist at Canterbury Museum. He was Keeper of Zoology from 1914 till 1924, when he moved to be director of Auckland Museum. His time at Canterbury Museum was interrupted by war service in 1916 and 1917 with the New Zealand Field Artillery in France during the First World War. A more substantial account of his career is given in Gill (2008).

Robert Alexander Falla (1901–1979).—Born in Palmerston North on 21 July 1901, Falla began part-time studies in science at Auckland University College, and in 1919 and in 1921 he took up a teaching scholarship at Auckland Teachers Training College. During this time he used his weekends and holidays to carry out field work, particularly in the Hauraki Gulf, Northland, and the Bay of Plenty. The Danish *Dana* expedition visited New Zealand in the summer of 1928–1929 and Falla was invited to join it for three weeks off the east coast, which provided first-hand experiences in international science. On his return he joined

the honorary staff of the newly opened Auckland War Memorial Museum. In 1929 he became Assistant Zoologist to the British, Australian and New Zealand Antarctic Research Expedition (BANZARE) lead by Sir Douglas Mawson. The expedition vessel, *Discovery*, cruised in the southern ocean and made landings at Crozet, Kerguelen, Heard, and Macquarie Islands and coastal east Antarctica. During two summers Falla was responsible for all ornithological investigations and assisted with the routine gathering of biological information. In 1937 Falla was appointed director of the Canterbury Museum (Dell 2010). He inherited a museum in a dire financial state and with the help of Robert Speight managed to create a public fund to help with much needed building work and a “spruce up” for the ailing museum (Figure 8). He became firm friends with Edgar Stead (see below), who through his personal wealth and contacts within *The Press* newspaper also assisted with the public fund for the museum. During field trips with Stead and others he investigated Lake Ellesmere, the beds of the Canterbury rivers, the cliffs of Banks Peninsula, and the forests of Westland. He instigated major museum investigations of moa remains at Pyramid Valley, north of Christchurch, and of the moa hunter archaeological site at Wairau Bar.

Falla was awarded a DSc by the University of New Zealand for his work on birds. In 1939, with the aid of a grant from the Carnegie Corporation of New York, he was able to study museum development and displays in the United States, United Kingdom, and Europe. For a short period after the commencement of the Second World War, Falla served in a naval auxiliary patrol. When coast-watching stations were established early in 1941 in the Auckland Islands and on Campbell Island, Falla was called in as an adviser. He was instrumental in having young scientists included in the personnel at each base, and set up a scientific programme and he also served in the field. The long series of published works on the geology, zoology, and botany of these islands bears witness to the value of his efforts. In 1947 Falla was appointed director of the Dominion Museum in Wellington (Dell 2010). A complete bibliography can be found in Dell (1980). His final and most enduring legacy to Canterbury Museum was his part in the passing of the Canterbury Museum Trust Board Act 1947, which finally gave the museum security of funding and separation from the financially insecure Canterbury College after more than half a century of uncertainty.

Raymond Robert Forster (1922–2000).—Forster served as Keeper of Zoology and Assistant Director from 1948 till 1957, when he became Director of Otago Museum. Primarily an entomologist and arachnologist there is little evidence during his tenure that the Ornithology collections were actively enhanced.

THE ROGER DUFF ERA

Roger Shepherd Duff (1912–1978).—In 1938 Duff was appointed Ethnologist at Canterbury Museum and he succeeded Robert Falla as Director of the museum in 1948. While not an ornithologist, it was the atmosphere of scientific endeavour and a much more comfortable financial situation that led to the Duff era being the most productive in the history of the museum. Amongst his protégés was Ron Scarlett, the



Figure 8. Staff of Canterbury Museum taken outside the whale courtyard about 1938. Sitting on the left is Roger Duff and on the right Robert Falla. Standing in the middle is P. J. O'Brien, taxidermist. [Canterbury Museum Accession no. 19XX_2_1236]

man who has made the most profound impact on Canterbury Museum's collections.

Ronald Jack Scarlett (1911–2002).—Born in Stoke, near Nelson, Scarlett was the oldest child of four brothers and four sisters. Ron's father was an itinerant sawmillier and Ron attended six primary schools until he began to work at age 14. He had jobs on farms, in a sawmill, as a labourer, golf greenkeeper, gardener, goldminer, and later as trucker for a coalmine.

Scarlett was undoubtedly an avid collector and some would have said his urge to collect bordered on disposophobia. During his life Ron amassed a huge personal collection of cigarette cards, postcards, stamps, natural history books, and natural history objects. Ron's habit of collecting shells was what probably got him involved in Canterbury Museum. Some of the earliest objects collected by Ron are in the malacology collections (1929–1940). Ron is certainly credited with helping in the initial Pyramid Valley moa swamp investigations between 1940 and 1942. He commenced a BA at Canterbury in 1938 as an adult entry student but did not complete the degree until after World War II. For a rural boy from a sheltered background Canterbury University was a revelation and it was during this period he became heavily involved in Christian peace activism.

This activism must have become quite radical for at the start of the war he registered himself as a conscientious objector. In late 1942 he was interned at Hautu Camp near Turangi in the North Island, a camp for people regarded as the most recalcitrant, and employed as a scrub cutter. Ron would occasionally talk about the experience and the resistance the inmates would put up when the conditions and treatment became oppressive and it is possible that this experience created the obsessive collector that Scarlett later became.

Following his release from internment, Ron completed Professor Henry Skinner's anthropology course at Otago University and in early 1950, shortly after Roger Duff began as director, Ron joined Canterbury Museum as Recorder of Collections, later moving to be Curator in Osteology. In this role he worked on the collections of the Museum, collected new material, and assisted archaeologists with bird and other animal identifications. One cannot underestimate the importance of Duff's patronage on Scarlett. On his release from the Internment Camp Ron would have been *persona non grata* in New Zealand society had

not Roger Duff taken him into the museum fold and nurtured his promise. This was something for which Ron was forever grateful. This gratitude is most poignantly expressed in his dedication to Duff in his book *Bones for the New Zealand Archaeologist* (Scarlett 1972b).

Ron's first taste of field palaeontology was at Pyramid Valley where he is first recorded assisting on the site on 29 November 1940. In 1941 and 1942 Duff's field notes record Ron regularly assisting him. In 1948 he assisted the joint American Museum of Natural History and Canterbury Museum expedition lead by the AMNH ornithologist Robert Cushman Murphy. This party also included the then acting director W. R. B. Oliver, Edgar Stead, and Robert Falla. In the following year Director Roger Duff decided that a more systematic expedition should be made. Between 29 January and 4 April 1949 Ron and Jim Eyles almost single handedly excavated 75 moa skeletons from 17 12 x 12 foot quadrates (Canterbury Museum unpublished archives; Figure 9).

Scarlett was active in the museum's archeological society and was a founder member of the New Zealand Archaeological Association in 1954 and founding editor of the *New Zealand Archaeological Association Newsletter* (now *Archaeology in New Zealand*), editing the first four volumes.

During his career he became the most prolific avian osteologist in New Zealand describing 100s of sites and six species (Tables 7 and 8; see Anonymous 1979:ii-iv)]. He generally concentrated on Late Quaternary avifauna and probably his most significant finds were the New Zealand Owlet-nightjar (*Aegotheles novaezealandiae*; Scarlett 1968) and Hodgens' Waterhen (*Gallinula hodgenorum*; Scarlett 1955). Some of his new taxa were disputed by overseas osteologists most notably Storrs Olson of the Smithsonian Institution in Washington, D.C. The most acrimonious of these disputes was over the existence of *Gallirallus hartreei* described in Scarlett (1970). At the end of a series of letters and papers on this subject Olson famously quipped "To accept *Gallirallus hartreei* as a valid species would appear to require faith; in this instance I do not count myself among the faithful" (Olson 1979:79). Ron only occasionally delved into the rest of the Tertiary. He did describe a new genus and species of penguin (Moisley's Penguin) from the Pliocene (Scarlett 1983) and assigned a large humerus to a European genus and species of bony-toothed birds (Pelagornithidae) (Scarlett 1972a).

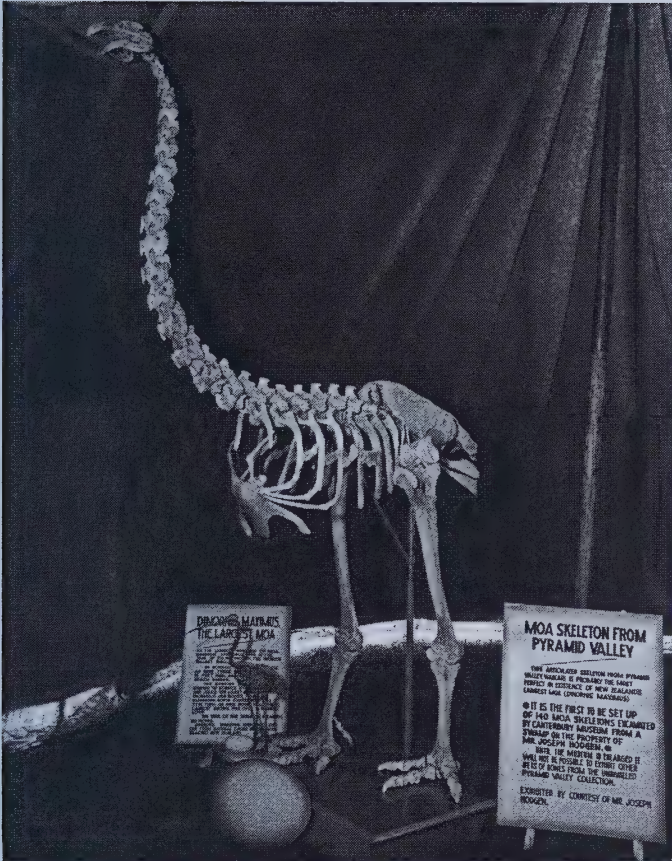


Figure 9. The first articulated Pyramid Valley moa skeleton on display during the Canterbury centenary celebrations. Green and Hahn photograph. [Canterbury Museum Accession no. 19XX.2.2076]

In 1969, members of the Tyree family found a very large bird bone in cliffs to the north of the Waipara River in north Canterbury. Scarlett described this bone (Scarlett 1972) as a distal humerus of a bird very similar to a pelagornithid but did not suggest what species. However, the anatomy of bony-toothed bird wing bones is very unusual and this

Table 7: Species named by Ron Scarlett

Common name	Scientific Name	Date	Details	1° Types
Moisley’s Penguin	<i>Tereingaornis moisleyi</i>	1974	Probably congeneric with <i>Spheniscus</i>	Zfa11
New Zealand Pelican	<i>Pelecanus conspicillatus novaezealandiae</i>	1966	A synonym of <i>Pelecanus conspicillatus</i>	AV21355
Eyles’ Harrier	<i>Circus eylesi</i>	1953	A synonym of <i>Circus teauteensis</i> Forbes	AV6039
New Zealand Owlet-nightjar	<i>Megaegotheles novaezealandiae</i>	1968	Now considered <i>Aegotheles novaezealandiae</i> (Scarlett)	AV16996
Hodgens’ Waterhen	<i>Rallus hodgeni</i>	1955	Now considered <i>Gallinula hodgenorum</i> (Scarlett)	AV6197
Hartree’s rail	<i>Gallirallus hartreei</i>	1970	A synonym of <i>Gallinula hodgenorum</i> (Scarlett)	AV18475

Table 8: Species named in honour of Ron Scarlett

Common name	Scientific Name	Namer
Scarlett’s Duck	<i>Malacorhynchus scarletti</i>	Storrs L. Olson
Scarlett’s Shearwater	<i>Puffinus spelaeus</i>	Richard N. Holdaway and Trevor H. Worthy

bone was actually a proximal humerus (Olson 1985). This was one of Ron’s greatest embarrassments and it is unfortunate that peer review failed to pick up this error. Ron’s second fossil description also suffered from lax reviewing (Scarlett 1983). Ron was convinced that Moisley’s

Penguin was actually a member of the extant South American and African genus *Spheniscus*. However, following conventional wisdom of the day, the reviewer (probably George Gaylord Simpson) could not accept that *Spheniscus* could either exist in New Zealand nor that an extant genus could occur as far back as the Pliocene and thus insisted that Scarlett describe this taxon in a new genus. This Scarlett did somewhat reluctantly, putting his new penguin in the genus *Tereingaornis*. Recent osteological work shows that Scarlett was probably right (pers. obs.).

Scarlett was for many years an active member of the Ornithological Society of New Zealand where he frequently wrote contributions for the quarterly scientific journal, *Notornis* (for a complete bibliography see Anonymous 1979:ii-iv). After retirement in 1981 (Figure 10) he continued to work at the Museum on a voluntary basis as Emeritus Curator of Osteology and published articles on naval history. In 1996 he was awarded a Member of the British Empire (MBE) medal from the crown for his services to science. Ron continued at the museum as Emeritus Curator of Osteology till at least 2000. He died at the age of 91 on 9 July 2002.

One of Scarlett's greatest and most lasting achievements was a small publication that appeared in 1972, at Duff's suggestion, entitled *Bones for the New Zealand Archaeologist*. It consists of hand drawn outlines of the larger bones of all the most common species of mammal and bird found in New Zealand Archeological sites.

No other single person has had such a significant impact on the vertebrate collections of Canterbury Museum. Nearly 8,000 objects are recorded as personally collected by Ron and accessions show that during his period on staff (1950-1981) the Vertebrate Zoology Collections grew at a rate unequalled in the history of the museum. Ron's museological practices were somewhat primitive reflecting both his frugality and the poverty of Canterbury Museum at the time: he was famous for his use of matchboxes to store small objects and as a life-long smoker often employed cigarette packets. His handwriting, particularly in his later years, is legendary for its illegibility. He was fond of using cheap ball point pen even in catalogues and on labels and it takes considerable experience and patience to decipher a Scarlett label.

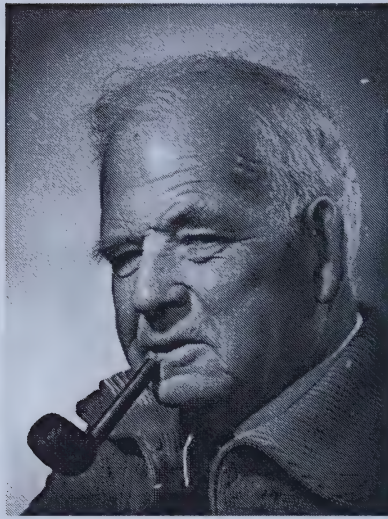


Figure 10. Ronald Jack Scarlett taken shortly before his retirement. [Canterbury Museum Accession no. 19XX_2_4312]

RECENT YEARS

Michael Malthus Trotter (1935–).—Trotter took over as director following the death of Roger Duff in 1978. During his tenure the museum had two staff managing the vertebrate collections.

Geoffrey Arnold Tunncliffe (1945–).—Tunncliffe was employed from 1968–2000 as Curator of Vertebrate Zoology, starting as an authority on the wading and freshwater birds of Canterbury and especially Lake Ellesmere (i.e., Tunncliffe 1965). His major research interest while in his later years at Canterbury Museum was on tooth wear (thegosis) in mammalian teeth and avian beaks (e.g., Tunncliffe 1973; Every et al. 1998).

Beverly Ann McCulloch (1934–2006).—McCulloch was born in Auckland, and spent most of her life in Christchurch. In the 1960s she

started a science degree at Canterbury University and then worked with the government's Department of Scientific and Industrial Research as an illustrator. Following an argument with Roger Duff in 1968 she was issued a trespass notice banning her from entering the museum. This remained in force until Duff's death in 1978. She was employed as liaison officer at Canterbury Museum in 1983 and from 1989, Bev became Curator of sub-fossil birds. During her tenure in this position the Museum participated in major digs of sub-fossil material at Treasure Downs Swamp near Cheviot in North Canterbury and at Harris Swamp near Waimate in South Canterbury (Worthy and Holdaway 2002; unpublished Canterbury Museum archives). Her major publishing achievement was *Unearthing New Zealand* (Trotter et al. 1989, 1997) jointly with Michael Trotter which was a popular introduction to New Zealand archaeology. Extinct avifauna were also the subject of a series of small popular books, (e.g., McCulloch, 1982, 1992; for a complete bibliography see http://archaeopedia.com/wiki/index.php?title=McCulloch_Bev). Her legacy for the collections was a briefly used numbering system using a new, SB (Subfossil Birds) prefix, and the splitting of the archaeological specimens from the natural history collections.

R. Paul Scofield (1966–).—Scofield has been employed since August 2001, under the leadership of Anthony E. Wright, who became Director in 1998. He was originally employed as Collections Manager–Natural History and became Curator of Vertebrate Zoology in 2003. His bibliography is available at <http://canterburymuseum.academia.edu/PaulScofield/Papers>.

THE TAXIDERMISTS

Andreas Reischek (1845–1902).—In late 1876, Haast asked his old friend Ferdinand Hochstetter to find a suitably qualified Austrian to visit New Zealand for two years to assist in setting up displays in the Canterbury Museum. Reischek arrived in Canterbury on 22 April 1877, and began work on the 24th. When he arrived the new wing was still empty and was due to be opened on 10 June, and “by then Sir Julius wanted to have by the best groups [of taxidermied animals] ready.” (Reischek 1924:19). The mammals that Haast had wanted Reischek to

prepare were mainly American quadrupeds supplied by Louis Agassiz (at the Museum of Comparative Zoology in Harvard University in the USA) more than 10 years earlier. These had been supplied as cured skins and the skill required to turn these into life-like and attractive mounts can not be underestimated. The first groups were completed in time for the opening and included three grizzly bears in front of a cave, a lynx and a condor. A bear and the condor survive till this day. Haast was a flexible employer allowing Reischek time for excursions (although requiring him to work late to complete tasks) and it was during this time that Reischek really fell in love with New Zealand. He was already amassing a collection of birds that he would later take back to Austria. In the following two and a half years, Reischek mounted various large exotic mammals. Prior to the end of his contract with the museum in early 1879, he accompanied Haast on a two-month expedition to the Southern Alps (Reischek 1924).

In July 1879, he departed Christchurch for the North Island and over the following 10 years made several extended collecting expeditions, covering most of New Zealand and its sub-Antarctic islands, collecting biological and ethnographical specimens, including Māori skulls and mummified remains robbed from burial sites.

William John Sparkes (1851–1934).—Sparkes was born in London, the son of a joiner, his family emigrating to New Zealand in 1863 arriving in Lyttelton aboard the *Brothers Pride* on 8 December. He began at Canterbury Museum early in 1870 as a junior, becoming Senior Taxidermist in 1883. During his apprenticeship he learned his craft from Fredrick Fuller and Andreas Reischek (see Gill 2008). A “fine collection” of representative New Zealand birds was labelled as exhibited by William Sparkes at the fourth Colonial and Indian Exhibition in London in 1886 (Saunders 1886) when Haast visited Europe as New Zealand Commissioner to the exhibition. Sparkes (Figure 11) served under Haast, Forbes, Hutton, and Waite but resigned amid controversy in 1909 following 41 years service at the museum. His quarrel resulted from his being overlooked for the position of Assistant Curator, which was given to the academically qualified Robert Speight (S. Burrage pers. comm.).

Earl John Haynes (1876–1953).—Following Sparkes’ resignation, Earl Haynes was employed as a taxidermist. He was already an



Figure 11. William John Sparkes (aged about 42) and daughter Stella (aged about 10). Unknown photographer. [Canterbury Museum Accession no. 19XX.2.4994]

accomplished taxidermist who had been supplying the museum specimens since 1905, and he was elected a Fellow of the Zoological Society of London (FZS) in 1913. Prior to the departure of Scott's ill-fated 1910–1911 British Antarctic Expedition, the naturalists from the

expedition spent a time at Canterbury Museum. Emphasizing the importance of these links is a letter from Edward Wilson to Hayes written shortly before Wilson's death in the infamous Antarctic March. [Letter to Mr Haynes, 17 January 1911 [Scott Polar Institute in Cambridge "MS 789/1, From McMurdo Sound to a taxidermist at [Wellington] Museum, New Zealand]. Haynes accompanied Edgar Waite from May and July 1912, during the first oceanographic cruise of the *S.S. Aurora* which was part of the Australasian Antarctic Expedition lead by Douglas Mawson (Mawson 1915). This trip included collecting on Macquarie Island and the Auckland Islands (Figure 12). We know little of Haynes' life but Canterbury Museum's catalogues give a tantalizing glimpse into Haynes' adventures. For



Figure 12. E. J. Haynes in 1929 with Mottled Petrel *Pterodroma inexpectata*. [Canterbury Museum Accession no. 2004.98.144]

example, we have Fijian war clubs from 1915; New Guinea birds from 1919; and a copy of the Thursday Island, *Daily Pilot* (Thursday Island is between Australia and Papua New Guinea) presented by Haynes in 1928. Haynes retired from the museum in 1936.

Raymond Joseph Wadman Jacobs (1906–1974).—The son of a traveling taxidermist, Ray Jacobs first began work at Canterbury museum in 1926 as assistant to Haynes and worked his way up to be Principle Taxidermist and head of the display department. After 46 years service he was awarded the MBE in the 1974 New Years Honour's list “. . . for meritorious contribution to taxidermy and museum display.” The investiture was by the Governor General at a special ceremony at his bedside only weeks before his death. Jacobs was a particularly talented man. In addition to being an outstanding taxidermist he constructed the foreground and painted the huge backdrops for all the habitat groups, constructing evocative dioramas such as the Spotted Shags (*Stictocarbo punctatus*) of Bank's Peninsula, the terns on the beach at Okarito and the Keas (*Nestor notabilis*) in Arthur's Pass, for the Edgar Stead “Hall of New Zealand Birds” that opened in 1956 and is still extant today.

Patrick J. O'Brien (birth and death dates unknown).—O'Brien was employed as taxidermist from 1937 until 1946 (Figure 13).

James (Jim) Roy Eyles (1926–2004).—The famous “Wairau Bar moa hunter” was briefly employed at Canterbury Museum from November 1946 until March 1947. Eyles and Ron Scarlett were employed during the summer of 1949 to excavate at Pyramid Valley. They removed 75 moa skeletons (Canterbury Museum unpublished archives) and among their assistants was Robert Cushman Murphy of the American Museum of Natural History. Later, Eyles was the inaugural Director of Nelson Provincial Museum and later the Hokitika Museum (now the West Coast Historical Museum) (Eyles 2007).

Charles John Lindsay (1902–1966).—Lindsey was employed as assistant to the taxidermist at Canterbury Museum in 1916 and resigned in 1924 (Figure 14) to take up the position of taxidermist in charge of the Newtown Museum, Wellington, which later became the Dominion



Figure 13. P. J. O'Brien preparing the Swamp Harrier diorama still present today. Unknown photographer. [Canterbury Museum Accession no. 19XX.2.4989]

and National Museum and is now Te Papa Tongarewa The Museum of New Zealand.

J. Terrance Jacobs (1938–).—Terry Jacobs worked as a taxidermist at Canterbury Museum between 1966 and 1973 when, following his father's death, he began his own taxidermy business that is still operating today under the management of his son David.

BENEFACTORS

Edgar Fraser Stead (1881–1949).—Born in Christchurch, Edgar was the son of George Stead a grain and export merchant who was also



Figure 14. C. J. Lindsay at the Newtown/Wellington South Museum March 1925 shortly after leaving Canterbury Museum. [Canterbury Museum Accession no. 2004.98.100]

President of the local chamber of commerce, Chairman of the Board of Directors of *The Press* newspaper, and a successful racehorse owner. Young Edgar Stead was interested in birds from early childhood. Over the years he built up an exhaustive knowledge of Canterbury's bird life, giving special attention to changes brought about by settlement and by predatory mammals. Stead studied electrical engineering at Canterbury College, followed by three years at the research laboratories of the General Electric Company at Schenectady, New York. During this period in New York he collected avidly and amassed a representative collection of eastern North American birds. Soon after returning from America he organised the project for which he is perhaps best remembered: the recovery of the skeleton of a blue whale cast ashore at Okarito on the West Coast. In 1890 George Stead had bought the *The Press*, then in a seriously run-down state. The following year he became Chairman of its Committee of Directors. He put the newspaper back on its feet with a combination of new plant and a progressive management and journalistic policy. It was through the raising of a subscription from the people of Christchurch through *The Press* that the Blue Whale was brought to Canterbury.

On the death of his father in April, 1908 Edgar inherited a large fortune and devoted the remainder of his life to ornithology and hunting. He became an accomplished photographer and with slides he lectured widely, stressing the need to protect the dwindling populations of native birds. His shooting expeditions to Lake Ellesmere resulted in his first published paper (Stead 1923), on migratory waders. He collected a number of specimens to support his records and most of these were deposited in the Canterbury Museum. In 1927 he wrote a summary chapter on the birds of Canterbury for the volume prepared by the Philosophical Institute of Canterbury, *Natural History of Canterbury* (Stead 1927). His book, *The Life Histories of New Zealand Birds*, was published in 1932 (Stead 1932). He named two new subspecies of Fernbird (*Bowdleria punctata*) and a new subspecies of Bush Wren (*Xenicus longipes*) from islands off Stewart Island. His scientific contribution was that of a highly gifted and critical amateur field naturalist. He acted as Honorary Curator of Birds Eggs for many years at Canterbury Museum and his highly significant collection of birds and eggs was bequeathed to Canterbury Museum. Stead's field studies and general contribution to natural history and ornithology were recognised by his election to the fellowship of the Royal Society of New Zealand in 1948. As well as an international reputation in ornithology and field sports (especially shooting) he was also equally well known in Christchurch for his gardens at Ilam (now the University of Canterbury Staff club), whose center piece was a remarkable Rhododendron collection.

Benjamin Michael Moorhouse (1859–1921).—Benjamin Michael Moorhouse was the great nephew of William Sefton Moorhouse, a leading civic leader of Christchurch. His family began Shepherd's Bush Station in the country between the South Hinds and the Rangitata. Educated at Christ's College and later Edinburgh University, Acland (1946:290) described Moorhouse as a fine sportsman and outdoors man. During World War I he gave up his medical practice in Christchurch and spent some years as a combat surgeon in Europe. Prior to leaving he left his collections at the museum "on deposit" as was common practice at the time. Following the war he did not return to Christchurch permanently but served as a ships doctor, dying in Russell, in the Bay of Islands, in 1921.

THE BUILDINGS

Seven buildings make up the complex that is now the Canterbury Museum (Table 9). The museum was originally housed in the Canterbury Provincial Council Buildings (see Haast section above). At least four other ephemeral buildings have existed for the display of the Blue Whale Skeleton and Maori artifacts or Taonga.

The bird displays have been in three locations during the history of the museum: from 1867-1870 they were in the Provincial Council Buildings; from 1870-1958 they were in the Mountfort Gallery (Figures 3 and 15); and since 1958 they have been in the Edgar Stead Hall in the Centennial Wing. Information about storage of the undisplayed collections is vague. Until about the 1880s all items in the collection

Table 9: Buildings making up Canterbury Museum complex

Date	Designer	Name	Description
1870	B. Mountfort	Known as Mountfort Gallery	1 level with mezzanine and lean too office extension to north
1872	B. Mountfort	South Wing (part)	1 level with mezzanine and lean too extension to north
1877	B. Mountfort	South Wing (part) & Entrance & East Wing	2 level south wing with offices and exhibition spaces. East Wing with exhibition spaces and mezzanine
1882	B. Mountfort	Roofed Courtyard	Courtyard between 1870 and 1877 buildings roofed
1958	Miller White Dunn	Centennial Wing	2-3 story office and exhibitions area with basement
1977	John Hendry	Roger Duff Wing	4 story addition
1995	Christchurch City Council	Garden Court Building	5 story addition filling in the existing courtyard

were on display. It appears that when the collection outgrew the museums ability to display all items (Figure 16), surplus items were stored in prefabricated sheds "out the back." This situation changed little until the building of the Centennial Wing in 1958, when purpose designed storage was installed in the area now housing the Natural History Suite. However, moa bones and some foreign skins didn't fit into the new storage areas and space was found in other parts of the building including the basement. Skins and mounts were stored in wooden cabinets manufactured on site. In about 1980, several purpose designed steel cabinets were purchased to carry the more valuable specimens and the concept of a cabinet for type material and extinct species was initiated. In the mid 1990s, Richard Holdaway was employed to re-house the comparative skeleton collections, amassed by Ron Scarlett, in the corridor leading from the Natural History



Figure 15. View showing the 1877 Mountfort extension to the front of the existing building Note the prominent fleche now absent. Photo circa 1880. [Canterbury Museum Negative no. 8360]



Figure 16. Canterbury Museum bird display circa 1930s. Unknown photographer. [Canterbury Museum Accession no. 19XX.2.4990]

Curators' offices towards the Display Department. In 2002, shortly after the author began at Canterbury Museum, a \$720,000 Lotteries board grant enabled the creation of a Natural History Suite with a self contained bird store. Sealed purpose built cabinetry was imported from the USA (Viking Systems) and the moa collection was placed in acid free boxes on a compactor shelving system.

HISTORY OF CATALOGUING AND NUMBERING

Museology has never been strong at Canterbury Museum and cataloguing, until the 1950s, was haphazard and labelling even more so. The first catalogues of specimens were drawn up by Haast prior to

1870 (Haast 1881) but these only contain lists of species and do not carry any collecting information. Until Waite's tenure specimens were split into Foreign and New Zealand collections with separate catalogues. The cornerstone of the ornithology collections is a card index established by Waite and six leather-bound judges' ledgers that were started by Scarlett when he started as Recorder of Collections in 1950.

Julius Haast began a list for each collecting area in the late 1860s (Haast 1881). It would appear that Robert Langley Holmes, the first clerk and custodian of the museum, was the primary keeper of these catalogues but, with his departure in 1868 to Fiji, the cataloguing became somewhat sporadic. Records of accessions of all items donated to the museum were published regularly in *The Press* until Haast's death and these remain some of our best information on locally collected specimens. A separate exchange ledger was kept with detailed information on items exchanged and received by overseas institutions. Items from European institutions usually have detailed labels with dates of collection, collector and locality, but this is not the case for locally collected specimens. It may be that Haast deliberately neglected to label specimens with collector and detailed locality to hide the identity of his collectors around the country. Haast appears to have been concerned that if overseas institutions knew the identity of his collectors and their location, they might try to deal with them directly. This concern seems to have been justified. There is evidence that Thomas Moore of Glenmark had a private exchange of moa bones with Leeds Museum in 1870 (Baker 2003), despite Haast signing an exclusive agreement with Moore for the rights to items collected in the swamp.

Intermittently between 1888 and 1901, William Caesar Sarsfield Colclough (son of the early New Zealand feminist, Mary Ann Colclough) was employed to "catalogue and print labels for the museum's collections." (Canterbury Museum unpublished Archives). It is not known if any of these catalogues or labels survives. In the museum library's copy of the three-volume *Handlist of Genera & Species of birds* . . . (Gray 1869), many of the overseas species are underlined and annotated with alphabetical a, b, c . . . giving sex and location for each individual. From the handwriting it would appear that the annotations in these volumes are those of Hutton and that this record is the first surviving detailed catalogue of the foreign bird collections at Canterbury Museum. Fredrick Hutton began a large

ledger book entitled *Fauna of New Zealand: Vertebrata & Mollusca: List of the New Zealand Collections in the Canterbury Museum Christchurch* sometime between 1899 (the last date of any synonym mentioned) and the publication of Hutton and Drummond's *The Animals of New Zealand* in 1904. This list seems to have been compiled by Hutton both to establish an accurate synonymy for this book and also to compensate for the absence of New Zealand birds in the catalogue in Gray's volumes.

During Waite's directorship the fish collection was the major priority. The few foreign birds that were accessed were recorded in the above mentioned copy of Gray's *Handlist*. However, there was apparently no formal cataloguing and species were simply ticked using a course hand in pencil. It is possible that some of the pencil entries in Hutton's *List of the New Zealand Collections* are from this era.

A numerical catalogue of the ornithology collections was begun some time after the publication of the last volume of R. Bowdler Sharpe's 1899–1909 *A Handlist of the Genera and Species of Birds*. Bird specimens were numbered with an O (for ornithology) and a sequential number that was taken from the order of birds annotated in Gray 1869 (e.g., from 0.1 (Griffon Vulture) to 0.1028 (Brown Pelican)). The New Zealand specimens and new foreign specimens that were added in the following years were numbered sequentially following catalogue number O.1028. The New Zealand species were catalogued roughly in the order they were found in Sharpe (1899–1909) and then any additional foreign species were added. Distinctive labels were printed using a press that is still in the museum's collections. After laying up each label on the press, a grey copy on heavy card was printed to place on the object and a copy was printed on thinner white card to be placed in a card file. These heavy labels appear to have been abandoned by the time of accession of the Buller collection in 1923. Buller collection specimens have small printed 30mm x 65mm manila luggage labels.

There is a list entitled *Absolutely Protected Species of New Zealand Bird in the Collections of the Canterbury Museum* dated 5 August 1938 in the libraries' collections. This list was probably an official response to the designation of many species of bird as Absolutely Protected in a list published in the Supplement to the *New Zealand Gazette* No. 17 (10 March 1938). The Museum's list annotates the number of mounts and study skins of each species absolutely

protected by this new law. A short lived ledger catalogue *Descriptive Catalogue of New Zealand Birds: Canterbury Museum, Christchurch, NZ* was begun on 1 January 1942, by R. A. Falla. He attempted to annotate all specimens currently in the collection. For each species O numbers were listed down the left hand column and sex, locality, and collector, and type of preparation information listed. This list was not completed and contains only kiwi, penguins, grebes, albatrosses, and petrels.

In 1950 Ron Scarlett began a series of catalogues in Judges Ledgers as part of his new position as Recorder of Collections. All were numerical starting at 1 with separate prefixes for each collection. The catalogue devoted to ornithology had an AV (Avian) prefix and was novel in the museum's history for cataloguing all avian remains (foreign and New Zealand, natural and archaeological, skeletal, mounts and study skins, fossil and recent) together. Scarlett's catalogues were also unusual in the fact that an object could have more than one catalogue number. For example a fossil bird might have both an AV and a Zf (Zoological Fossil) number. Where known, Scarlett recorded the earlier O catalogue number. Up until 1954 all items donated to the museum were recorded in a central accessions ledger. With the advent of the Wildlife Act in April 1954 specimens of New Zealand birds were recognised as belonging to the crown and thus could not be the property of the museum. To distinguish these Crown owned items, on 26 June 1959, Scarlett began a separate "pseudo-accession" system in separate *Vertebrate Zoology* and *Vertebrate Palaeontology* accessions books. Thus all birds on arrival had a number allocated AA/BB where BB was a two digit year of arrival at the museum and AA was a number beginning at 1 for the number of the item in that particular year. All bird specimens that entered the museum from 1959–1981 have detailed information on provenance and collector recorded in these ledgers.

With the installation of the Vernon Systems relational database, all museum departments (except Vertebrate Zoology) ceased keeping hand written catalogues in 2002. In Vertebrate Zoology all items accessioned into the Canterbury Museum vertebrate collections get a Vernon relational database entry and a hand written entry in a judges A4 ledger. Separate Vertebrate Zoology accessions ledgers have not been maintained and issues surrounding the Wildlife Act and the ownership of natural history specimens have not been addressed.

IMPORTANT ORNITHOLOGICAL COLLECTIONS

The Buller Collection.—Sir Walter Lawry Buller (1838–1906) was New Zealand's preeminent 19th century ornithologist and collector. His life and times and the history of his collections is monographed by Galbreath (1989). During his career he amassed four comprehensive collections of New Zealand birds. The first was donated to the Colonial Museum (in 1871, now Te Papa Tongarewa, The Museum of New Zealand) and the second sold to Sir Walter Rothschild (in 1889, now in the American Museum of Natural History). The third was sold to the Carnegie Institute and Museum in 1904. In 1899 Buller emigrated to Britain with his family where he later died. Walter Buller's daughter, Laura Madocks who had settled in Wales, offered the Buller families' personal collection of New Zealand birds for sale to Canterbury Museum through the auspices of Edgar Stead in July 1921:

“Glanywern,
Denbigh
July 26th/ 21

Dear Mr Stead,

I am sending you a catalogue of my father's collection of bird skins on Mr Tripp's suggestion. Do you think there would be any chance of selling them in the colony? I thought perhaps that the Christchurch Museum might be interested.

It is difficult to find a value on them but they have been keenly prized ever since 1905 when they were insured by my father for £1000 then! I suppose they are even more valuable now. Perhaps the museum would be prepared to make an offer. They belong to my sister-in-law (Mrs. Leo Buller) and myself now. I don't think we would refuse any reasonable offer. About six months ago she and I had them all out and we found them in perfect condition. My father was anxious that his collection should not be broken up. I know that you interest yourself very much in this museum and if you there would be any chance of this museum

making and offer or any private collection I would be most grateful.

Yours Laura Madocks”

(Canterbury Museum Archives Box 17, Directors correspondence 1922)

Galbreath (1989:324) mentions that Buller had referred to this final collection as his son's. Buller (1888a:243) refers to his elder son, Leo skinning a Black Petrel (*Procellaria parkinsoni*) obtained from Māori hunters, who had captured it in the southern North Island. Thus, it seems that Leo's collection not only included material from his father, but also specimens collected and prepared by Leo himself when he was in his twenties. However, Laura Madocks refers to the collection as being “her fathers.” Madocks' letters to Stead state unequivocally that it belonged to her and her sister-in-law, Mrs Leo Buller. It seems likely that the descendents of Walter Buller felt that the collection belonged to *both* Walter Buller and his son or sons. The death of Leo about 1919 presumably precipitated the sale of this collection (the other son of Walter, Percy had died in 1910). Laura Madocks states in her letters to Stead (Canterbury Museum unpublished archive) that following her father's death in 1906 she had only opened the cases containing the collection once in 1919 or 1920 and they seemed in good order. Walter Buller's 1905 insurance valuation was probably based on his selling a collection of 600 specimens to the Carnegie Museum for £1,000 in 1904 based on a valuation supplied by R. B. Sharpe of the British Museum. A similar value placed on a smaller collection may indicate that Buller felt that the remaining collection was more valuable but Buller frequently placed higher values on his collections than they eventually fetched. The presence of a leucistic yellow Kakapo (*Strigops habroptila*) in this collection that he stated that he valued highly (Galbreath 1989) may indicate however that this collection contained his favourite and most precious specimens. The specimens in this collection were collected between 1859 and 1903 but the majority were collected around 1892.

Despite the supposed valuation of £1,000, the council of the Canterbury University College offered only £425. She replied that no doubt her father would have liked the collection to return to the colony and thus she would be prepared to part with it for £500. The university council eventually agreed, possibly due to strong lobbying by Stead. It

is even possible that Stead, who was a wealthy landowner, paid the full cost out of his own pocket (J. A. Bartle pers. comm.). The collection was dispatched on 10 August 1922 aboard the ship *Constantine* and was received by the Museum on 10 October 1922, but it was not accessioned until 22 February 1923.

The Museum's annual report for 1923 (Anonymous 1923) states that Buller used many of the specimens in making his published taxonomic descriptions, yet the origin of this assertion is uncertain. It is also not clear why Laura Madocks offered the collection to Stead and not elsewhere. However, she was encouraged to talk to Stead by a mutual acquaintance, L. O. H. Tripp, a prominent Wellington lawyer and the Buller families' lawyer in New Zealand. Perhaps Laura Madocks did not wish to participate in commerce with strangers in her dead father's belongings.

The E. F. Stead Collection.—In October 1948, Edgar Stead contacted the recently appointed Director of Canterbury Museum, Roger Duff (probably verbally) with the offer of his unsurpassed collection of New Zealand bird skins and eggs. As there was not enough storage space at the museum at the time for the 737 skins, it was agreed that the collection would remain at Stead home *Ilam* until space could be made available. A number of caveats to the donation were stipulated, the collection was accessioned into the ledger on 16 December 1948 (Canterbury Museum accession ledger), and the donation was finalised in a letter dated 20 December 1948. It was arranged that “early in the new year,” 1949, the Keeper of Zoology, Ray Forster, would visit Stead to catalogue the collection (Canterbury Museum unpublished archives). Sadly Stead died before this visit could be arranged. In July 1949, Forster wrote to Stead's friend and biographer, David Macmillan, asking whether he may have a catalogue to the skins. Macmillan replied that Stead had always meant to prepare one but had “never got around to it.”

The Moorhouse Collection.—Benjamin Michael Moorhouse bequeathed, in 1921, both his deposited collection (see above) and a further more exotic collection (no doubt collected during his times in Europe and as a ship's doctor (see above) to Canterbury Museum. As well as some ethnological artefacts, the bequest contained “a great collection of moa bone” obtained mostly from “near Waimate” and

about 75 native bird skins including several Kakapos, several Huia (*Heteralocha acutirostris*), a Chatham Island Fernbird (*Bowdleria rufescens*, AV998), an excellent collection of native birds eggs including 2 Laughing Owl (*Sceloglaux albifacies*) eggs (AV3359 & 3360), the very rare egg of a New Zealand Quail (*Coturnix novaezelandiae*) (AV3358) and several foreign birds eggs including a Passenger Pigeon (*Ectopistes migratorius*) (AV24083). Amongst the skins are a collection of New Guinean birds (mostly the more easily shot species close to major ports) but also containing a Red Bird of Paradise (*Paradisaea rubra*, a species restricted to islands off Irian Jaya) and various lizards and bats.

The O'Connor Collection.—Albert Creagh O'Connor (1883–1952) sold his collection of bird skins to Canterbury Museum in 1942 during the tenure of Robert Falla as Director of Canterbury Museum. He was one of the last amateur collectors of New Zealand birds. He was profession a wool auctioneer based in Wellington and regularly travelled to other New Zealand centres for the periodic wool sales. When in Nelson, Christchurch, or Invercargill, he borrowed the firm's car for the weekend to visit nearby bush or tidal estuaries. He liked to bring home a bird from his trips, so that he could prepare the skin in the evenings of the following week, within talking distance of his invalid wife (Fleming 1980). O'Connor's generation overlapped with that of H. H. Travers and other commercial collectors such as Smythe, Bills, and Dannefaerd and his collection contained specimens from each of these professionals that were obtained through exchange and sale. It is clear from his catalogues he obtained most of his specimens through exchange though many were purchased (Table 10). Specimens that O'Connor exchanged with Drew, Westbury, and Falla are in the collections of Te Papa Tongarewa the Museum of New Zealand.

COLLECTIONS HELD AT CANTERBURY MUSEUM FROM SIGNIFICANT SITES

Earnsclough Cave.—Earnsclough Cave was an important early site in the study of New Zealand palaeo-ecology. It was discovered in late

Table 10: Source of items in the O'Connor collection (of 744 catalogued items)

Source	#	Exchanged	To	From
Dr T. E. Cahill	1	H. G. Drew	10	14
H. H. Travers	10 (2 exchanged)	Dominion Museum	3	1 (Lindsay) 3
W. Smyth	8	Westbury (identity unknown)	10	
H. Hamilton (Australian Antarctic Expedition)	18	T. Andrews (identity unknown)	4	3
Nelson (possibly mostly with Elliot)	16 (1 exchange)	C. A. Fleming	31	16
Christchurch	5	American Museum of Natural History	18	14
Auckland	7	E. F. Stead	9	17
Purchased	18	Auckland Museum	19	10
A. Yuill (taxidermist of Wairarapa and later at the Dominion Museum)	13	"Lady B" (identity unknown)	9	
R. O'Connor (A. C.'s Brother)	3	R. A. Falla	7	1 (Reischeck) 13
R. Sutherland	1	M. W. F. Tweedie (probably) of the Raffles Museum, Singapore	2	
Wellington	2	E. G. Elliott (Taxidermist of Nelson)	2	
E.A. Petherick	1	Canterbury Museum	3	3
R. S. Stidolph	1	Invercargill Museum		2
(E). J. H. Prendeville	9	School Service	1	
S.J. Dannefaerd	26			
F. Cockcroft	1			
C. G. Teschmaker	1			
R. A. Wilson	1			
W. J. Plowden-Wardlaw	1			

1870 by the son of a gold miner named Weir (Anon 1871, Hector 1872). Thomas Cockburn-Hood (1874) recovered bones, including those of moa and small birds, which he gave to Julius Haast for the Canterbury Museum. The Canterbury Museum accessions notices in *The Press* mention that between October 1873 and December 1873, T. H. Cockburn-Hood donated “a collection of bird bones from lowest floor of cave in which part of the skin and feathers of a Moa were found. Obelisk Hill, Otago.” Although the Canterbury Museum collections now include several moa feathers there is no indication in the accession documents that this donation included feathers. A complete history of excavation of Earnsclough Cave near Alexandra in Central Otago is detailed in Clark et al. 1996 and Worthy 1998a.

Aorere Caves.—This site was first mentioned by gold-diggers working on the nearby goldfield in 1857 (Anonymous 1857). In 1859 the Nelson Provincial Government invited Hochstetter, on the initiative of the Nelson Chamber of Commerce, to visit Nelson and make a report on the province’s mineral wealth. F. F. Hochstetter arrived in Nelson on 4 August 1859, accompanied by Julius Haast. Hochstetter (1859, 1863) discusses the exploration of Aorere Caves in the “last months of my stay.” Hochstetter (1863:183). Haast and a young surveyor Christopher Maling collected “two pack-bullocks loaded with moa bones” (Hochstetter 1859:1) over three days while Hochstetter visited the coal field. Hochstetter left Nelson for Sydney on 2 October 1859 aboard the *Prince Alfred*, on the first leg of his return voyage to Europe. Three caves were named in the group: Hochstetter Cave, Staffords Cave and Moa Cave. Until recently it was unclear that any material from this early moa site remained in New Zealand. It is clear from Hochstetter (1863) that the entire Aorere Cave *Palapteryx ingens* specimen collected by “diggers” went to Vienna from Nelson Museum and most if not all of those collected by Haast and Maling, apparently for Hochstetter, were deposited in Vienna. Hochstetter (1867:186) mentions that the Provincial Government of Nelson made a collection from the caves after he left the country. This collection is stated as having “results equally favourable” [to Hochstetter’s] (Hochstetter (1859:1). As Haast was the Nelson Provincial Geologist during this time it is most likely that these excavations were made by Haast. Canterbury Museum now has only one specimen clearly identified as being from this site. It is *Anomalopteryx didiformis* Av8552 (3.4.7).

The only legible things on the existing hand-written label (stuck to bone, white with blue edges and "No" printed in top left corner) are:

"L tibia"

"M. didiformis or/ parvus"

"Aorere caves Nelson 1860"

On a separate printed glued on label in lowercase is "parva." These printed labels are thought to have been placed by F.W. Hutton.

The presence of the names *parvus* and *M.* (presumably *Megalapteryx*) suggests that the label must have been written after 1884 when these taxa were described and the handwriting indicates that it may have been written by H. O. Forbes who was Curator between Dec 1888 and June 1892. Hochstetter left New Zealand in 1859. If the date is correct then this specimen is most likely to be from the collection of the Provincial Government of Nelson mentioned by Hochstetter as having occurred after he left the country.

Glenmark.—The history of moa finds and exploration at Glenmark Station has been somewhat simplified by subsequent authors. George Henry Moore (1812-1905) was station manager and part owner of Glenmark Station, one of only three large stations that occupied the whole arable area of North Canterbury. On Monday, 4 January 1857, Moore's "men tracing up a drain through a peat swamp to the spring at the foot of the hill in the rear of his woolshed, came across a number of huge bones in a very high state of preservation" and found "three of the finest specimens of the great Moa-bird remains which have yet been found in this colony" (Anonymous 1857:7). On 14 November 1864, a subsequent, larger find at Glenmark was brought to Haast's attention through an article in *The Press* but it is not clear that he acted on it despite being encouraged to do so by the editor of the newspaper (Anonymous 1864). We do know that in late 1866 Haast, while visiting Moore:

"found no less than twenty-five skeletons of the *Dinornis elephantopus* and *Dinornis crassus*, of different ages . . . Dr. Haast did not succeed in finding the remains of a member of the *giganteus* tribe, but Mr Moore kindly presented him with several valuable specimens, and otherwise assisted him very materially in prosecuting his researches. Besides being amply supplied for the Canterbury Museum, Dr. Haast will now have the

opportunity of obtaining valuable exchanges from abroad in return for these much esteemed natural curiosities" (Anonymous 1866:2).

The accession ledgers indicate Moore gifted these bones (Accession Number: 29/1866). It would appear however that these were the only bones Moore donated, as subsequent accessions are not noted in the donations ledger, indicating that they were probably the result of financial transactions. Either way, Haast's first paper on the finds at Glenmark (1868) rather simplifies the bartering and politicking that must have gone on and it has recently come to light that Moore directly exchanged specimens from the site with Leeds Museum in 1870 (Baker 2003). In March 1871, Fuller found the type specimens of *Harpagornis moorei* amongst a "considerable quantity of moa bones" found "during the progress of excavations" (Haast 1874). It is unfortunate that recent workers have given this taxa the common name Haast's Eagle when it was Frederick Fuller, the Canterbury Museum's taxidermist at the time, who supervised excavations at Glenmark in 1871 and 1872 (Haast 1874) and as Haast admits, Fuller who recognized the bones of *Harpagornis* as being from a gigantic eagle. It would appear that later in 1871 excavations may have ceased but a second excavation was made at the original site and a site nearby in 1872 which led to the discovery of *H. assimilis* (Haast 1874); now recognized as a male *H. moorei*.

Kapua.—In late September 1894, Thomas A. McDonald "clearing a springhole on lot 11" in the Kapua Settlement, Arno, near Waimate, found bones identified by Frederick Wiliam Sevvick Jones as moa. Jones was a councilor with property in the district (Cyclopedia of New Zealand 1903 p. 1063; Anonymous 1903). Hutton was alerted to the site after reading the article in the *Timaru Herald* (Anonymous 1894a) and visited the site on or about the 12 October 1894 (Anonymous 1894b). He purchased the whole find for £20 and sent W. J. Sparkes, the museum taxidermist, to oversee the operation. These were formally accessioned into the museum on 5 November 1894 and were retrospectively given the accession no. 69/1894. Hutton's 1895 paper states there were 2387 perfect bones of which only 233 remain in the collections of Canterbury Museum as most were exchanged with other museums.

Enfield.—During the late winter of 1891, a Mr. Fleet was ploughing a field in the Enfield district, near Oamaru, when he discovered a large quantity of moa bones. The farm belonged to Thomas Meek, a wealthy local grain merchant, who informed Harry Archibald DeLautour, the local General Practitioner and a member of the New Zealand Institute. After investigating the site and recognising its potential DeLautour convinced the landowner not to plough further and telegraphed the information to Henry Ogg Forbes at the Canterbury Museum. Forbes and William Sparkes, the museum's taxidermist, went down to Enfield and on arrival engaged two men to assist in digging. In a single day working "from very early until dark" (Anonymous 1892:7) they excavated from four pits the bones of 350 individual birds and estimated that 800 birds may have been present at the site. The bones were in an excellent state of preservation, embedded in a layer of peat and remarkable in the fact that "in no case were the bones more than three feet below the surface" (Anonymous 1891:7). In addition to moa bones they found *Harpagornis*, *Cnemiornis* (including a skull that Finsch mistook for an extinct relative of the Cape Barren Goose and named *Cereopsis novae-zealandiae* (Forbes 1892b), the type tarsometatarsus of the New Zealand Musk Duck (*Biziura delautouri*; Forbes, 1892a) and the bones of Finsch's Duck (*Chenonetta finschi*) and a small kiwi (*Apteryx* sp.). The newspaper account states that "under one moa breast bone, which was perfectly complete, [we] found the contents of the stomach of the bird in a splendid state of preservation, comprising chewed grass, with numerous white crop stones." (Anonymous 1891:7). They also found moa egg shell. They removed from the site 29 boxes of bone. Following Forbes' rather ignominious departure, and Hutton, following his appointment to Canterbury Museum, examined the Enfield collections and found 1,031 perfect adult leg bones that he could measure. He did not find the type material of *Cereopsis novaezealandiae* and *Biziura delautouri*, which we now know to be in the collections of the Natural History Museum in London. The disappearance of this material was one of Hutton's many complaints over the curatorship of Forbes and the whereabouts of part of the Enfield collection was discussed at length in the newspapers of the day. Ironically, given the complaints Hutton had regarding Forbes' disposal of bones, Hutton began an active exchange program using the Enfield collections and today only 195 catalogued

numbers (making up 331 items) can be identified in Canterbury Museum's collections as having come from Enfield.

Hamilton's Swamp.—In early 1870 a Cornish goldminer uncovered a find of moa bones at Hamilton Swamp in Central Otago. Soon after the site's discovery B. S. Booth, a member of the New Zealand Institute, dug a pit and removed 56 leg bones (and miscellaneous other bones). However, because there were problems accessing the site due to it being in an active claim, work was abandoned. In December 1873, Booth found that the mining company, in pegging off a new claim, had left the 1870 pit outside their boundary. He informed the editor of the *Mount Ida Chronicle* about the deposit, who inserted a note in his paper and the *Otago Daily Times* copied this notice. Hutton, then at the Otago Museum, read the *Otago Daily Times* notice and on the 15 January 1874, he visited the site, making arrangements with Booth to begin excavations. Canterbury Museum has a small representative collection of 36 catalogue numbers (65 items) including *Harpagornis*, *Cnemiornis*, and all moa species recorded from the site. There is no record of this collection being exchanged or accessed but accession probably occurred at the time Hutton moved to Canterbury.

Moa Bone Point.—Moa Bone Point Cave in the Christchurch suburb of Sumner had been known since officers aboard *H. M. S. Acheron* had, in 1849, found a number of moa bones near the cave entrance (Trotter 1975). At a monthly meeting of the Canterbury Philosophical Society in 1870, Edward Jollie, suggested to Haast that the systematic excavation of the cave might elucidate the period of the moa's extinction. To fund the excavations Jollie prepared a subscription list and collected £32 10s. This was sufficient to employ two men (one was Alexander McKay, an ex goldminer, who later became a prominent geologist) for seven weeks. The work began on the 23 September and ended on 9 November 1872. While it was clear that Haast was the employer and McKay the employee, Haast did not immediately publish the results of this excavation and so after a delay of two years, McKay presented a paper on the excavations (read by his employer Sir James Hector) at the Wellington Philosophical Society. Haast first heard of McKay's paper in *The Press*. The neglected material from the excavated cave was quickly re-examined by Haast and a long paper

prepared called “Researches and Excavations carried on in and near the Moa-bone Point Cave, Sumner Road, in the Year 1872.” This paper was read before the Philosophical Institute of Canterbury on the 15 September 1874, and in it Haast provided the account of the cave’s excavation (Haast 1875a), to which he added a postscript in which he attacked McKay and Hector for theft of intellectual property “the abettor of such a perfidious transaction being as guilty as the perpetrator himself.” (Haast 1875b:530). This disagreement was made worse by a fundamental disagreement about what the Moa Bone Point Cave material showed. Haast’s hypothesis was that the moa had not been hunted by Maori but by a more ancient, ethnically distinct race: the moa-hunters. McKay and Hector argued that ancestral Maori had hunted them to extinction. The disagreement between these men and their allies created an ill-feeling which, spurred on by provincial rivalry, remained evident long after the matter had been resolved scientifically (Thode 2009). McKay’s original paper was never published. An abbreviated paper “On the Identity of the Moa-hunters with the present Maori Race” (McKay 1875) did appear in the same issue of the Transactions as Haast’s summary of the Moa Bone Point Cave (Anderson 1989).

The total number of bones collected in and about Moa-bone Point Cave by Haast’s team was about 300 of which only five collection numbers and 30 bones remain (the rest of these objects may have been exchanged). Subsequent excavations between the late 1940s and 1969 are summarized in Trotter (1975). These excavations collected about 500 bones of 22 species (including five moa), the majority of which were catalogued in the Canterbury Museum collections by Ron Scarlett.

Te Aute.—On 9 July 1888, Augustus Hamilton reported to the Hawkes Bay Philosophical Society on the discovery of a large deposit of moa bones “at the south east end of the large tract of swampy land that surrounds the [Te Aute] Lake,” Hawkes Bay (Hamilton 1889:314-315). Canterbury Museum has a small collection (60 Av numbers) from this site entirely made up of moa (five species dominated by *Euryapteryx curtus* and *Dinornis*). Canterbury Museum accession ledgers indicate that single femora of *Dinornis*, *Anomalopteryx*, and *Euryapteryx curtus*, and a single tibiotarsus and tarsometatarsus of *Euryapteryx curtus* from Te Aute Swamp were presented to the Museum by Augustus Hamilton on 25 June 1892, after

Forbes had left Canterbury Museum and Hutton had began his tenure. It is possible that the other material is part of the loan of material Hamilton made to Forbes personally which may have been left by Forbes when he departed for England (Worthy 2000).

Pyramid Valley.—Although some details of the history of this important site are given in the account of Ron Scarlett's career (above), no discussion of the vertebrate collections at Canterbury Museum would be complete with mentioning Pyramid Valley. On 28 December 1938, David Hope of Springston wrote to R. A. Falla at Canterbury Museum describing a finding of moa bones in a swamp on the property of J. and A. Hodgen at Pyramid Valley near Waikari in North Canterbury. Hope expressed the opinion that the deposit should yield individual skeletons, and subsequently brought to the Museum the long bones of a large specimen of the South Island giant moa *Dinornis robustus* (Av8416) in an excellent state of preservation. The first reports were based on examination of the stratigraphy and the contents of 24 pits. The pits were dug at various points in a swampy paddock, where probing with steel rods indicated the presence of bone. Work proceeded sporadically during summer weekends from 1939 to 1941 (Duff 1949). Holdaway and Worthy (1996) have comprehensively summarised the subsequent excavations. The collection consists of 2,400 bones of a minimum of 440 individuals of 41 taxa and, 23 families of birds as well as gecko (Geckonidae), Tuatara (*Sphenodon*), and Greater Short-tailed Bat (*Mystacina robusta*).

Wairau Bar.—The Wairau Bar moa-hunter site was first discovered by the schoolboy Jim Eyles in 1939. Wairau Bar is recognised as the earliest site of human occupation recognised in New Zealand. Apart from the first finds which are held by Te Papa, Canterbury Museum holds the bulk of this collection. The history of the excavations at Wairau is summarised in Buckley et al (2010). A summary of the avian remains (ca. 1000 catalogued items) is in Scofield et al. 2003.

Takahe Valley.—Following the discovery of Takahe (*Porphyrio hochstetteri*) in Notornis Valley in 1948, and in the course of field work in October 1949, Ken Miers, a wildlife field officer of the Department of Internal Affairs, was searching the floors of the limestone cliffs on the south side of the valley for evidence of their use by Takahe as a

winter retreat. He found bird bones that were both naturally preserved and from Maori middens on the surface. These included a scorched vertebra of the Upland Moa *Megalapteryx* and moa, Takahe and Kakapo feather deposits. An expedition was led by R. A. Falla in December 1949, to the site and extensive collections were made, the bulk of which is held in Canterbury Museum (Duff 1952, O'Regan 2007).

Papatowai and Pounawea.—These important moa-hunter period sites in the Catlins of north-eastern Southland were excavated by David Teviotdale in the 1930s, by Les Lockerbie (Papatowai) and by Les Lockerbie in the early 1960s, and later by Jill Hamel (Pounawea). The Canterbury Museum vertebrate collections have 157 catalogued items mainly from the 1958, 1959, and 1960s excavations at Papatowai and 1,275 catalogued items mainly from the early 1960s excavation but also including surface material collected in the 1960s and 1970s (Pounawea).

West Coast Caves.—Throughout the 1960s, 1970s, and early 1980s, members of the Canterbury Caving Club (principally Graeme Wilson) and the Buller Caving Group (principally Philip Wood) collected material from newly found caves from as far north as Heaphy River and Takaka Hill and as far south as Te Anau. Details of this exploration and many of the finds are detailed in Lipyeat (2003), Worthy (1993b), Worthy and Holdaway (1993) and in *Bulletins of the New Zealand Speleological Society*.

Taranaki Caves.—Throughout the 1960s and 1970s, members of the Taranaki Caving Club, most notably David Medway, collected material from caves in the Mahoenui area. Details of this exploration and many of the finds are detailed in Lipyeat (2003), Millener (1981), and in *Bulletins of the New Zealand Speleological Society*.

Marfell's Beach.—The site was first collected by Jim Eyles and Roger Duff in 1944 and occasionally by Eliot Dawson and Ron Scarlett between 1940 and 1970. The largest collections at this important natural site were made by Jack and Ruby Britton, who collected bones between 1952 and 1962. The bulk of the collection from all contributors is in Canterbury Museum (catalogued by Ron Scarlett). The history of the

excavations at and summary of the avian remains (ca. 7,500 catalogued items and at least 900 individuals of 89 taxa) are in Worthy (1998c).

Albury.—In March 1963, while draining a paddock at Albury Park on the Tengawai River near Fairlie, the station owner, Andrew Hope made a substantial find of bones in a peat-filled springhole (Worthy 1997). R. Scarlett and H. Woodhouse made a one-day visit to the site on 26 September 1963 and collected a substantial sample (230 Av collection numbers). Following further drainage, Michael Trotter and Beverley McCulloch visited the site on 5 February 1972 and collected additional material. The Canterbury Museum collection contains large numbers of *Pachyornis* and *Emeus* moa from this site with rarer *Euryapteryx* and *Dinornis*. The only evidence for *Megalapteryx* at this site was the presence of green eggshell. Fourteen other bird taxa were recorded, most notably *Harpagornis*, *Cnemiornis*, and one of the few inland records of South Island Crow (*Corvus antipodum pycrafti*). The radiocarbon dates available for Albury Park swamp range from about 9700 to 7200 yrs BP and suggest that the site dates from the earliest Holocene.

The Deans.—In late 1978, an ancient slip, covering an area of about 55 hectares, was reactivated on the property of M. N. Turnbull, at “The Deans,” near Weka Pass in North Canterbury (Burrows et al. 1984). The site was intermittently visited during 1979 by a team from University of Canterbury and Canterbury Museum, who found a small fauna (72 Av numbers) with *Emeus* and *Euryapteryx* moa most common, rare *Dinornis* (including a complete individual), and 11 other bird species.

Treasure Downs.—An important botanical and archaeological wetland complex was discovered in 1986 by Ira McNab on the property known as “Treasure Downs” located approximately 1.5 kilometres along Caverhill Road to the northeast of Cheviot township in North Canterbury. In June 1987 an intensive salvage excavation was made during which the bones of about 20 individual moa were found. A second more formal dig involving museum and University of Canterbury staff was made in February 1988. Significant drainage of the wetland has occurred over the 20th Century (McCulloch 1987). The

large collections are not yet completely catalogued and the field books associated with the excavations have not been transcribed.

Other Canterbury Sites.—The excavation history and lists of the faunal remains of various sites on the South Island held in Canterbury Museum are detailed in Worthy 1993a, Worthy and Holdaway 1995, 1996, Worthy 1998a,b.

EXCHANGED MATERIAL

The history of exchange with overseas museums is detailed in Burrage (2003). Three large exchanges contain a significant number of ornithological specimens.

Otto Finsch, Deutsches Kolonial-und Uebersee-Museum, Bremen.—Friedrich Hermann Otto Finsch (1838-1917) began his career as Assistant Curator of Ornithology at the Reichsmuseum of Natural History in Leiden (1862-1865). Following a New Guinea expedition he continued his ornithological work at Bremen's "Gesellschaft Museum" (now Uebersee-Museum). During his time in Bremen, Finsch focused on parrot species and other birdlife found in the Indo-Pacific. He also spent time documenting Somalian birdlife in East Africa and took part in expeditions to the polar regions, including Greenland, Siberia, and Lapland as well as North America. Between 1869 and 1879, Canterbury Museum received 1,115 bird skins from Finsch due to a friendly set of correspondence with Haast, in exchange for several large consignments of New Zealand bird skins and moa bones (Burrage 2003). Labels and the original shipping catalogue supplied by Peter Rene Becker in 2001 indicate that approximately half the collection was from German New Guinea and Indonesia and the rest from Europe, North, and South America. Many specimens were collected by Finsch himself during his New Guinea, North American, and Polar expeditions. Finsch began a Pacific tour in 1879, his "Letter from the Pacific" published in *Ibis* (Finsch 1882) indicates that he visited Christchurch and Canterbury Museum on 26 May 1881.

William Macleay, Macleay Museum.—The Macleay collections now held at the University of Sydney were established by British

entomologist Alexander Macleay. Alexander's son William Sharp Macleay, a leading naturalist in 19th century Australia, substantially increased the size of the collection and concentrated on birds and other vertebrates. Haast traded mostly skins of New Zealand birds with William Macleay and in return received a large but poorly labelled collection of Australian material.

W. H. Flower, the Hunterian Museum of the Royal College of Surgeons and Natural History departments of the British Museum at South Kensington.—Although both were intimately involved in moa biology, the relationship between Richard Owen (the founding Director of what became the Natural History Museum) and Haast was strained due to Owen's imperious manner and stinginess when it came to exchanging specimens. He preferred to send casts rather than original specimens in exchange (Barton 2000) although admittedly these were often casts of types. Haast however had an active relationship with Owen's rival and successor, the far more generous William Henry Flower (1831–1899). The initial impetus for this friendship was Flower's interest in rare whales. Haast sent Flower the skeletons of at least three beaked whales, one of which, *Mesoplodon haasti* Flower, 1878 (now considered *Mesoplodon grayi* Haast, 1876), Flower named after Haast. Flower took over the directorship of the British Museum of Natural History in 1884 and several exchanges of birds occurred between 1884 and Haast's death in 1887.

CONCLUDING REMARKS

Canterbury Museum has made significant contributions to ornithology in New Zealand since its inception in 1867. Although there was a hiatus in the early 20th century there has always been at least one staff member in charge of the vertebrate collections. Research and publishing in ornithology, has been important, especially in the 19th century and since Ron Scarlett's appointment in 1950. The bird collection is second only to Te Papa Tongarewa, The Museum of New Zealand, in size and has the most significant collection of historic and extinct species of any New Zealand museum.

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Alexander, William Sharp, and William John Macleay: Their Ornithology and Museum

*Graham R. Fulton*¹

ABSTRACT.—The Macleays amassed one of the largest natural history collections in Australia. When it was handed over to The University of Sydney as the Macleay Museum, in 1888, it passed on more than 10,000 bird specimens. Very few of these bird specimens have been lost, although many have been damaged through perfidious management. The collection was once displayed in its own grand building at the university—it has now been retired to its own attic. Alexander Macleay began collecting in Scotland from about 1770. His “Cabinet” of insects became the finest in Europe and subsequently Australia. Pecuniary problems and retrenchment forced his hand in relocating to the juvenile colony of New South Wales, in 1827, along with his “Cabinet.” His birds were donated to the Linnean Society of London. In New South Wales most of his birds were sent back to London. At his death he passed his famous collection to his son William Sharp Macleay, a philosophical naturalist and contemporary of Charles Darwin and Jean-Baptiste Lamarck. William Sharp’s own evolutionary theory temporally sat between the theories of these two giants. He explained derived characters as homologies and analogies, but he could not relinquish his God as the creator and was confounded by the nature of convergence. His birds, mostly from Cuba, went the same way as his father’s: to London and then lost. William Sharp Macleay continued the Macleay’s pre-eminence in natural history, in Australia as the savant of the colony—finally passing the collection to his cousin William John Macleay. William John is the Macleay most responsible for the Macleay Museum’s bird collection. He bought and exchanged birds from all over the world with considerable zeal. However, it was the Australian and Pacific Island birds that are his most important acquisitions. Macleay collected these before they were to become threatened or extinct. The collection boasts many of the rarest birds in museum collections, for example, Night Parrot (*Pezoporus occidentalis*) skin, Dodo (*Raphus cucullatus*) bones, and 20 Kakapo (*Strigops habroptilus*) skins. William John Macleay sent his collectors to hot spots throughout Australia, Micronesia, and Fiji. He financed and headed the first Australian expedition to New Guinea—the *Chevert* Expedition, which collected 1,000 birds, many of which were new species or subspecies. William

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John Macleay was the greatest philanthropist of his day towards Australian natural history. He gave his time and energy as well as his fortune to this science. The Macleay's collections were passed on, in trust, to The University of Sydney and the people of Australia. However, the collections have been broken up and the Macleay Museum Building sub-divided for offices and teaching space: A breach of trust, a broken promise, and/or an unfortunate fact-of-life?

INTRODUCTION

During a break in lectures in the early 1990s, I took a friend's advice and climbed the iron and wood staircase to the third floor attic of the Macleay Building and stepped back in time. I discovered a small museum with polished cabinets, complete with stuffed extinct Thylacines (*Thylacinus cynocephalus*) behind glass, threatened Saddlebacks (*Philesturnus carunculatus*) on perches, a drawer full of extinct Huia (*Heteralocha acutirostris*) skins, and the only mounted skeleton in the world of the extinct Paradise Parrot (*Psephotus pulcherrimus*)—natural history wonders to beguile an awestruck undergraduate (Figure 1).

The first impressions of this unexpected attic-museum are stunning; its drawers will keep you in awe of the past and provide the scientific substance that will keep students working well into the future. The Macleay Museum once stood emphatically, as a grand building of Sydney and of the University. Now its collections are spread across the sprawling grounds and buildings of The University of Sydney and elsewhere, with the museum itself confined to an attic.

The importance of the Macleay Museum bird collection has grown over time as the bird populations, from which the specimens were collected, have declined or disappeared. Now like many of its specimens the Macleay Museum is itself degraded and endangered.

FOUNDATIONS: ALEXANDER MACLEAY (1767–1848)

The Macleay Museum is the oldest natural history collection in Australia, its foundations rooted in England with Alexander Macleay's cabinet. In renaissance Europe cabinets that held ethnographic, biological, and other artifacts were assembled by gentlemen of wealth. They went hand-in-hand with rich libraries and wealthy homes. As

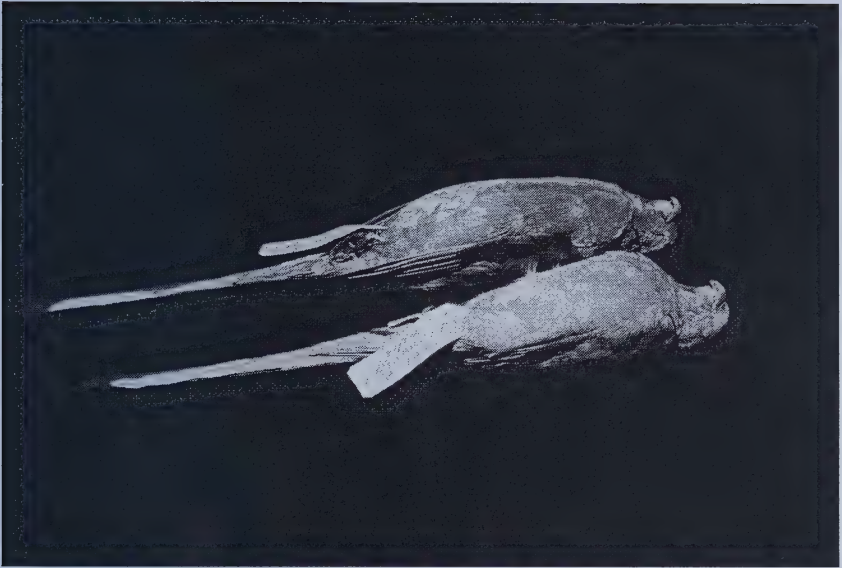


Figure 1. Skins of male and female Paradise Parrots (*Psephotus pulcherrimus*). John Gilbert discovered the Paradise Parrot on the Darling Downs in 1844. When informing John Gould of the discovery Gilbert remarked that it far surpassed in beauty every other species of the genus. In publishing a note of the discovery the following year Gould proposed the specific name *pulcherrimus*. In 1922 Cyril H. H. Jerrard photographed a pair nesting in a termite mound. Jerrard's black and white images are the only photographs taken of the species alive. The last confirmed sighting of the Paradise Parrot, by Jerrard, came a mere five years later (Fulton 1998a). (Photo G. Fulton).

these cabinets of curiosities multiplied so did the exchange of their contents and, to degrees, their accumulated knowledge. Cabinets could be considered the precursors of today's museums. The precise time of Alexander Macleay's awakening interest in the natural world is unknown, although this may have happened around his childhood home in Wick (ca. 1770s), a fishing town in the north of Scotland (Fletcher 1920, p. 569). Macleay's collection grew rapidly in the 1790s with the guidance of the Reverend William Kirby, a Fellow of the Linnean Society of London and Thomas Marsham, its founding Secretary. Alexander Macleay was elected a Fellow of the Linnean Society of

London in 1794, six years after it was established and became the second Secretary of the Society in 1798 (Fletcher 1893, p viii). By this time he was a serious collector and had embroiled himself in the cauldron of biological discoveries from the new worlds.

Alexander Macleay was also elected as a Fellow of the Royal Society in 1809, was a Foreign Member of the Academy of Sciences of Stockholm, and a Corresponding Member of the Academy of Turin (Linnaean Society of London 1849).

While Alexander Macleay did not publish himself, he featured prominently in the publications of others, particularly in regard to invertebrates. His interests also embraced the collection of other animal groups, including birds. This is evidenced by authors who viewed birds in his cabinet in England and donations of birds he made to the Linnean Society of London, The Zoological Society, and friends, as well as the recorded sale of bird artefacts at auctions. Macleay also sent birds to England from New Zealand and Australia, when he resided in Sydney, and donated others to the Australian Museum.

New South Wales.—At the age of 58, in 1824, Macleay accepted the position of Colonial Secretary to New South Wales (NSW). “I felt that in duty to my family I was bound to accept . . . but I cannot think it any subject of congratulations to be sent at my time of life with a large family to the very antipodes of all my Friends and Connections” (Holland 1988).

With his wife, six daughters, his library, and collections, Alexander Macleay sailed in the *Marquis of Hastings* and arrived in Sydney on 3 January 1826 (Anonymous 1826). He arrived in Sydney with the finest and most extensive cabinet in private possession, at a time when biological and other curiosities were travelling in the opposite direction—towards Europe.

Macleay’s first residence was in the Colonial Secretary’s House in Bridge Street (Forbes 1899); this arrangement persisted until 1839 (Fletcher 1920, p. 584) and reflected his position as the senior civil servant of the colony and his close friendship with Governor Darling (Historic Houses Trust 2010). Alexander Macleay was given land grants by Governor Darling on March 28, 1828, which included 54 acres (22 ha) at Elizabeth Bay (Dowling 1909, p. 55; Fletcher 1920, p. 585) and 15 000 acres (6,070 ha) at Camden (Historic Houses Trust 2010).

In September 1839, Alexander Macleay was joined by his eldest son William Sharp Macleay and a new chapter in the Macleay dynasty commenced. Alexander Macleay had accumulated a significant debt related to investments in a bank in Scotland that had failed, building Elizabeth Bay House and its gardens, providing infrastructure for his pastoral pursuits, and borrowing £18,000 from his son, William Sharp (Holland 1996). William Sharp took over the mortgage of Elizabeth Bay House for £12,000 and sent his father to live at his Camden property, Brownlow Hill. The collections remained in the Elizabeth Bay House; William Sharp offered for sale the family library of some 4,000 volumes and sold the furniture to help stave off bankruptcy (Historic Houses Trust 2010). With these arrangements William Sharp kept the creditors at bay, although it would be more than a decade after Alexander Macleay's death until his estate would be finally wound-up (Holland 1996). The economizing by William Sharp brought about a long-lasting rift between the father and son—the resulting estrangement never to be fully resolved. Alexander Macleay, “the Father of Australian Zoology,” died in Sydney on 19 July 1848 (Fletcher 1893, p. vii; Fletcher 1920, p. 569) as a result of injuries sustained in a carriage accident in 1846 (Fletcher 1920, p. 582).

SUCCESSIONAL CHANGE: WILLIAM SHARP MACLEAY (1792–1865)

William Sharp's arrival, in Sydney, marked a time of change for the Macleay collections. Alexander, a gentleman collector, publishing little while all the time expanding his collection and sending specimens from Australia and New Zealand to London (Fletcher 1920, p. 581–582; Macmillan 1957, p. 5). In contrast to his father, William Sharp Macleay became the savant of the colony, a philosophical naturalist. William Sharp published numerous scientific papers, including his own theory on evolution, his *Horae Entomologicae* (Macleay 1819, 1821), a classificatory system based on five elements that were used to form taxonomic groups. This work became commonly known as his Quinarian or the Circular System, which maintained its pre-eminence with some taxonomists (although abandoned by William Sharp) as the working hypothesis that defined the deity's natural-system. William

Sharp's theory progressively fell out of favor until Darwin's *Origin of the species* replaced it in 1859.

William Sharp's journey to New South Wales had taken a more circuitous and studious route than his father. He was educated at Trinity College, Cambridge and graduated with second class honors (Anonymous 1868). In later years, he reflected that "math and logic were the best training for observing and reasoning" (Holland 1988)—important tools for a natural scientist.

After graduating William Sharp took a post in Paris as attaché to the British Embassy, although his stay was cut short by the resumption of war with France. Following Napoleon's defeat in 1818, William Sharp returned to his role in Paris (Fletcher 1893, p. x). In this position he benefited from Napoleon's many benefactions to the natural sciences and he visited many of the major cabinets of Europe (Macleay 1819). He profited as a zoologist from meeting his French contemporaries Latreille, Cuvier, Saint-Hilaire, and Lamarck (Fletcher 1920, p. 593). Georges Cuvier and Pierre Latreille were eminent in establishing "comparative anatomy" with their prodigious work *Le Règne Animal* (*The Animal Kingdom*) (Cuvier and Latreille 1834). William Sharp also met with the "scandalously dangerous" Chevalier de Lamarck (Stacey and Hay 2007, p. 12), who had proposed that species may not be fixed entities created by a deity (Lamarck 1809). Thus, William Sharp's distinctions between affinities and analogies were well developed when he met with a young Charles Darwin in London, some 18 years later. William Sharp, the more senior and respected scientist, encouraged the young Darwin to publish an account of his voyage on the *Beagle*. Darwin then wrote to Leonard Jenyns, "zoologists of this place have been urging me to consider the possibility of publishing the Zoology of the Beagle's voyage . . . Mr Macleay has taken a great deal of interest in the subject and maintains that such a publication is very desirable" and to William Sharp "you, who aided me so essentially in publishing" (Darwin Correspondence Project Database 2011: letter 354 April 10, 1837; letter 513 May 29, 1839). *The Voyage of the Beagle* was subsequently first published in 1839, its publication bringing Darwin respect and notoriety.

William Sharp returned to London in 1825 when he had hoped to accompany his father Alexander Macleay to New South Wales. However, father and son were kept apart for another 14 years. Thus, as

Alexander Macleay set off to Australia, William Sharp Macleay set off to Cuba, where he would work with the Spanish and British Governments for the abolition of the slave trade (Fletcher 1893, p. x). On arriving in Cuba, in December 1825, William Sharp wrote a lengthy account of the ornithological observations made during the voyage, particularly from ports where he had stopped, to his friend Nicholas Aylward Vigors (Vigors 1826, p. 553). He also published *Remarks on the Comparative Anatomy of certain Birds of Cuba*, in 1827 (Macleay 1827). William Sharp served the British Government around the world and in each place he made natural history collections, many of which can be found in the collections of the Macleay Museum (Ng and Ah Yong 2001).

William Sharp preferred the hot and humid Cuban climate to that of England. He made his home at Guanabacoa, high on a hill overlooking Havana Harbor with its sea breezes much as he found later at Elizabeth Bay. He continued his work sending specimens of lizards, bats, and birds (45 species) to England and continued to amass entomological specimens in his own cabinet (Fletcher 1920, p. 602). William Sharp's motives for visiting Sydney, apart from rejoining his family, were undoubtedly an interest in its flora and fauna and its sub-tropical climate, England now having become too cold for him (Anonymous 1868). The extensive gardens of Elizabeth Bay House overlooking the harbor irresistibly appealed to him and not-the-least due to the many similarities it shared with his Cuban home (Fletcher 1920, p. 607).

William Sharp is written of as becoming reclusive in his latter days (Holland 1996). Contrastingly, a study of his work with the Australian Museum and the extensive correspondences and visits to Elizabeth Bay House by the most prominent names in natural history in England and Australia paint a picture of a savant of the colony deeply immersed in natural science (Fletcher 1920, p. 629). During John Gould's visit to Australia, 1838–1840, he received much help from William Sharp, whose kindness and co-operation Gould acknowledged in the preface to his *Birds of Australia*. William Sharp did not marry; he died on 26 January 1865, in his 73rd year.

WILLIAM JOHN MACLEAY: PASTORALIST AND POLITICIAN (1820–1891)

William John Macleay studied medicine at Edinburgh University. He relinquished his studies after the death of his mother, his last surviving parent, and immigrated to New South Wales on the advice of his uncle, Alexander Macleay. The young William (John) Macleay, not yet 19, proved to be in the right place at the right time on his long sea journey. He was in the company of his younger brother John Macleay and his cousins, George and William Sharp Macleay, the latter now a naturalist of considerable reputation and learning, and James Macarthur, a successful pastoralist and politician (Hoare and Rutledge 1974, Heydon 1967). During the voyage William John, with his cousins' influences, acquired an interest in natural history, probably through helping them collect specimens during the trip (Hoare and Rutledge 1974). William John Macleay was also advantaged by travelling with James Macarthur, who understood the financial basis of wool-selling and his wool usually brought the best prices in the colony (Fletcher 1929, p. 191; Heydon 1967).

William Macleay arrived in Sydney on March 1839. Spending only a few months in Sydney, before he set forth to the Lower Murrumbidgee District to make his fortune (Fletcher 1893, p xiii). He spent 15 years as a pastoralist, securing his considerable fortune (Hoare and Rutledge 1974). He also served 19 years as a member of the NSW Legislative Assembly and 14 years as a member of the NSW Legislative Council for the Pastoral Districts of Lachlan and Lower Darling (1856–1859) and Murrumbidgee respectively (1860–1874), he received a Life Appointment to the Legislative Council under the Constitution Act 1877 (Parliament of NSW 2010). During his years in Parliament, William Macleay undertook a significant amount of scientific work and benefaction. On retiring from the Legislative Assembly in 1874, he worked tirelessly in the pursuit of knowledge related to natural history (Fletcher 1893, p xiii).

The beginning of the modern Macleay Museum.—During William Macleay's parliamentary career and after his marriage he spent more and more time in Sydney, where his scientific interests were rekindled (Fletcher 1893, p. xix). In 1856, he became a member of the

Philosophical Society of New South Wales (Fletcher 1929, p. 211) and was elected to the Board of Trustees of the Australian Museum in 1861 (Fletcher 1929, p. 208).

In the early 1870s William Macleay began the extension of the Macleay entomological collections into a general zoological collection – “the beginning of the present Macleay Museum” (Fletcher 1893, p. xxx). In January 1874, William Macleay accompanied George Masters (Macleay’s full time collector/curator) to Wagga Wagga, NSW. Masters was taking delivery of a pre-arranged quantity of bird skins from a local collector, a Mr. West. William Macleay, taken by the quality of the skins, then acquired more from Masters and added them to his collection (Fletcher 1893, p. xxx; Fulton 2001). Masters wrote to Joseph James (J. J.) Fletcher confirming that William Macleay had a notebook, in which under the heading of *Macleayan Museum*, stated the following: “Bird skins purchased at Wagga on 8th January, 1874.” It went on to say that “29 species” were represented (Fletcher 1893, p. xxx). Following this entry there are many more, principally of birds, in this notebook, which is now known as the *Exchanges Book*. This book is a rough notebook that contains everything from pigment recipes to small notes on the movement (mainly outgoing) of the Macleay collections (personal communication, Jude Philp, Senior Curator, Macleay Museum, 18 January 2011).

William Macleay wasted no time in expanding the broader zoological collections sending collectors to various parts of Australia and the Pacific. About this time Edward Spalding (who had collected for him in the past) was sent to Endeavour River and Cleveland Bay, in north Queensland. Some of the acquisitions of these trips were dealt with (by various authors) in some of the earliest papers of the Proceedings of the Linnean Society of New South Wales (Fletcher 1893, p. xxxi). For example, Ramsay (1875a) described a new species of honeyeater from the Endeavour River district, Queensland, which he named *Ptilotus macleayana* [Macleay’s Honeyeater = (*Xanthotis macleayanus*)] after William John Macleay.

The Linnean Society of New South Wales.—Another chapter in William Macleay’s scientific development of the colony was the foundation and benefaction of The Linnean Society of New South Wales, founded in 1874. He “missed the vital meeting [that established

and named the society] on Thursday, 24th October [1874], because of the threat of rain and some indisposition, but despite this was informed the next day that the members wanted him for President” (Branagan 1973).

After a fire destroyed the Society’s collections and library in 1882, William Macleay headed the revival of the Society with meetings held in the Public Library, on Hunter Street, Sydney. A few months later he privately rented a more commodious house in Phillip Street and fitted it out for the Society’s needs and began restocking its library to its previous proportions. This arrangement continued for another two years (Fletcher 1893, p. xxxviii). In the meantime a search was made for a site to be the new home of the society; Macleay had offered to “bear the cost of the erection of a suitable building” if a suitable site was found. Sites in the city proved too expensive and the idea was abandoned (Fletcher 1893, p. xxxviii). Macleay again came to the rescue with a new building and land at Elizabeth Bay. In October 1885, the society’s new building was ready.

THE *CHEVERT* EXPEDITION

William Macleay was stimulated by, among other things, the visit of the *H.M.S. Challenger*, a scientific surveying ship, which refitted at Sydney (7 April to 9 June 1874) and whose officers and scientific crew had dined and collected with him (Moseley 1892 p. 230-231; Fletcher 1929, p. 227). Thus Macleay planned his own major natural history and ethnological collecting trip to northern Australia and New Guinea. This was the first expedition undertaken from Australia to a foreign land (Macleay Museum 2010).

Macleay purchased the *Chevert*, a 313 ton barque, for the expedition (Figure 2). The *Chevert* departed with considerable fanfare, including the presence of the Premier, a number of other politicians, and many influential residents. The *Chevert* had a crew of 20 commanded by Captain Edwards. Macleay was accompanied by his cousin Captain Arthur Onslow, George Masters, Dr. James (an American surgeon), three zoological collectors, W. F. Petterd, John Brazier, and Edward Spalding, and two botanical collectors (Fletcher 1893, p. xxxii). There were setbacks on the trip, but the *Chevert* expedition added approximately 1,000 birds, 800 fish, and many

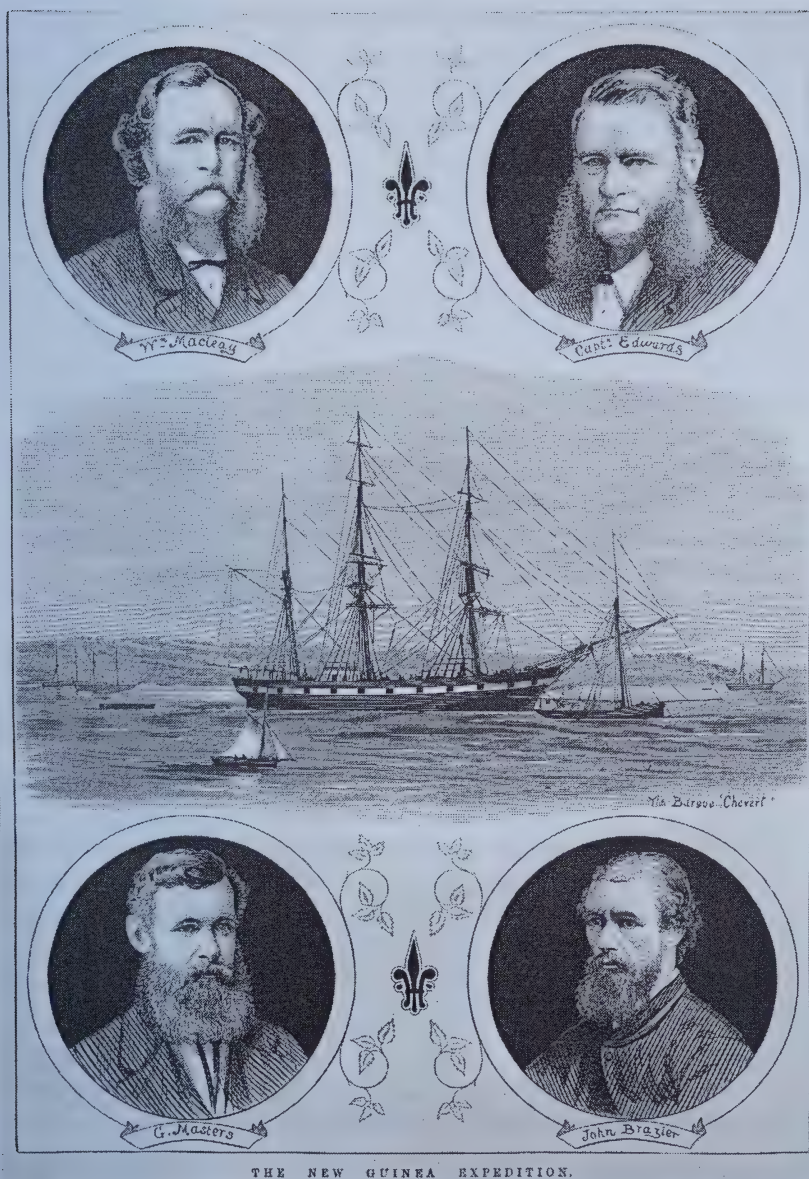


Figure 2. The Barque *Chevert* moored in Elizabeth Bay, prior to departure on the New Guinea Expedition with portraits of William Macleay, Capt. Edwards, George Masters, and John Brazier (Anonymous 1875a).

reptiles, mammals, insects, spiders, marine molluscs, and ethnographic objects to Macleay's collections (Macleay 1875b).

A chronicle of the expedition and the birds collected.—The following passage has been compiled from an abridged version of the expedition, based on the records in William John Macleay's private journal, as originally reported by him to The Sydney Morning Herald and published on 11 October 1875 and an essay by J. J. Fletcher in The Macleay Memorial Volume (Fletcher 1893, p. xxxii-xxxv). This has been annotated from various sources including my personal notes collated while working as a Macleay Museum Fellow; the Macleay Museum database; William John Macleay's (surviving) personal journals transcribed and digitised by D. S. (Woody) Horning (Macleay 1875-1881); and, Fletcher (1929). The first person voice used through the narrative belongs to William John Macleay; it was chosen to retain, as much as possible, the language of the day to recreate the sense of those times. It is also used because much of the material used in the narrative is taken from Macleay's personal accounts; quotation marks highlight when it was taken verbatim and not paraphrased. The birds reported here are not an exhaustive account from the expedition, although they are entered into in more depth here than in previous publications.

The first objective of the expedition was to reach the settlement of Somerset, close to the tip of Cape York Peninsula. On route the *Chevert* anchored at islands off the Queensland coast. May 29, anchored at Percy Island, although before reaching it specimens of Wilson's Storm-Petrel (*Oceanites oceanicus*), Black-bellied Storm-Petrel (*Fregetta tropica*), Black-browed Albatross (*Thalassarche melanophris*), Great-winged Petrel (*Pterodroma macroptera*), and Black Petrel (*Procellaria parkinsoni*) were collected at sea. Wilson's Storm-Petrel was the first Queensland record; Black-bellied Storm-Petrel the first Australian record and Black Petrel the only skin procured in Australia, to that time (Mathews 1917). Mathews also noted the specimen described as *Fregetta melanogaster* was his Black-bellied Storm-Petrel (*Fregetta tropica australis*). Mathews (1917) suggested that the occurrence of these three species this far north, in east Australian waters, was likely brought about by strong storm activity further south.

On Percy Island Bush Stone-curlew (*Burhinus grallarius*), Australian Raven (*Corvus coronoides*), and Leaden Flycatcher

(*Myiagra rubecula*) were collected (Fletcher 1929, p. 246). June 1-4, Palm Islands: anchoring off Brooke Island. On June 1, anchored off Brooke Island, "25 birds mostly of the extreme northern species, two of these shot by me [William Macleay] new to the collection" – Sooty Oystercatcher (*Haematopus fuliginosus*) and "Northern Gull" = Silver Gull (*Chroicocephalus novaehollandiae*) (Macleay 1 June 1875). William Macleay considered his Northern Gull new to him, because Gould (1865, p. 597-598) had separated Silver Gull into southern and northern species, describing one (*Bruchigavia jamesonii*), abundant around Tasmania, as more gracile than the more northern form named Gould's Silver Gull (*B. gouldi*) from Torres Strait, which Gould described as larger in all its proportions.

On Brooke Island, Masters shot a new form of Silvereye (Fletcher 1929, p. 246-247) and named it *Zosterops ramsayi* after Edward Pierson Ramsay of the Australian Museum (Masters 1875, p. 56). This is now regarded as an intergradient form between two subspecies of Silvereye (*Z. lateralis*) (Schodde and Mason 1999, p. 690-691).

June 2, Macleay's journal states they collected two eggs from a nest that was most likely an Eastern Osprey (*Pandion cristatus*) and came across a "tumulus of a Megapodius" [a tumulus is a domed burial mound, in this case it would have been an incubation mound of an Orange-footed Scrubfowl (*Megapodius reinwardt*)] (Macleay 2 June 1875). June 3-4, sailed to Brooke Island and collected Brown Booby (*Sula leucogaster*), Brahminy Kite (*Haliastur indus*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Orange-footed Scrubfowl, and Large-tailed Nightjar (*Caprimulgus macrurus*) (Fletcher 1929, p. 247). June 4, North Barnard Isles, landed with the object to get a species of *Ptiloris* [Victoria's Riflebird (*Ptiloris victoriae*)] peculiar to the island, and Mr. Masters was so fortunate as to procure a fine male and two females (Macleay 4 June 1875; Fletcher 1893, p. xxxii). The Macleay Museum holds three males and two females collected by George Masters at this site, suggesting that Macleay's entry is incorrect or that specimens collected elsewhere on the expedition were wrongly labelled.

June 5, Fitzroy Island, "little collected except some desirable birds" (Fletcher 1929, p. 247); "Among the birds shot were three swifts [Australian Swiftlet (*Aerodramus terraereginae*)] of a species lately described by Mr Ramsay." A note in the Macleay Museum database that suggests this could be the first specimen collected in Australia

cannot be correct, because Ramsay described this species (*Cypselus terrae-reginae* in Ramsay 1875b, p. 601) from mainland specimens collected in 1873-1874. Other birds collected here included "a kingfisher rejoicing in the specific name of *macleayi*" Forest Kingfisher (*Todiramphus macleayii*), Sulphur-crested Cockatoo (*Cacatua galerita*), dark morph of the Eastern Reef Egret (*Egretta sacra*), and Crested Tern (*Thalasseus bergii*) (Macleay 5 June 1875).

June 6, Trinity passage, Low Isles, Low and Woody Islands, "The shooting party got some specimens of the white reef heron [white morph of the Eastern Reef Egret], a gull or two and a tern, there were plenty of birds on the reef, but they declined allowing themselves to be shot" (Macleay 6 June 1875). June 7, a small sandbank, covered at high tide, off Turtle Reef, opposite the Endeavour River, "scarcely anything was got except two specimens of a species of tern which I had not before" [male and female Lesser Crested Tern (*T. bengalensis*)] (Macleay 7 June 1875).

June 9, anchored at Flinders Island that evening. After breakfast that morning the steam launch, had gone ahead and visited Barrow Island, "two birds new to my collection were procured" Caspian Tern (*Hydroprogne caspia*) and Varied Honeyeater (*Lichenostomus versicolor*). "We made in all about 50 miles today . . ." passing Cape Melville where "the rocks and boulders are massed together in a most wonderful way – all evidently granite" (Macleay 9 June 1875). June 11, at anchor six miles south of Piper Islands, Macleay wrote that there were two or three individuals of a species of woodswallow in the rigging that evening (Macleay 11 June 1875). Masters (1875) reported that four *Artamus leucopygialis* [White-breasted Woodswallow (*Artamus leucorhynchus*)] were collected at Cape Grenville in the ensuing days where he reported them common.

June 12, the *Chevert* arrived at Cape Grenville and stayed for five days during which time the captain and crew were occupied in watering the ship. The others spent their time collecting. On June 12, Macleay advises, "The only birds got for the collection were a *Grauculus* [White-bellied Cuckoo-shrike (*Coracina papuensis*)], a gull [(Silver Gull)] and an Oyster Catcher [Australian Pied Oystercatcher (*Haematopus longirostris*)]" and June 13, "They got 4 species of birds new to my collection, Curlew, noddy [Common Noddy (*Anous stolidus*)], Pachycephala [Mangrove Golden Whistler (*Pachycephala*

melanura)] and a *Ptilotis* [honeyeater], the last an undescribed species” (Macleay 12-13 June 1875). There were no new honeyeater species from Australia published by Masters for the *Chevert* expedition or in the Macleay Museum. Five honeyeater species were collected at Cape Grenville: Yellow-spotted Honeyeater (*Meliphaga notata*), Graceful Honeyeater (*M. gracilis*), Varied Honeyeater (*Lichenostomus versicolor*), Brown Honeyeater (*Lichmera indistincta*), and Helmeted Friarbird (*Philemon buceroides*). Masters collected a new Silvereye at Cape Grenville on June 14, which he named *Zosterops flavogularis* [Pale White-eye (*Z. citrinella albiventris*) (ABRS 2009)]. More Silvereyes were obtained from islands in the Torres Strait (Masters 1875, p. 56-57).

June 18, the settlement of Somerset was reached: “sailed through the Albany Passage., cast anchor about a mile and a-half beyond it in Mud Bay” (Fletcher 1893, p. xxxiii). The *Chevert* and company collected specimens around Somerset for seven days, taking the steam launch to the Somerset Mission each day, while waiting until June 26 for the mail from Sydney.

June 19, at Somerset, “Masters got some small birds, which he thinks to be new” [these were type specimens of White-browed Scrubwren (*Sericornis magnirostris minimus*) (ABRS 2009)] (Fletcher 1929, p. 249). “He thinks and he is probably right that the many collectors there have been at Cape York have always been on the lookout for showy or highly prized birds and have neglected or known nothing about those of small size and sombre” (Macleay 19 June, 1875). June 21, “Masters and Dr James went out for birds, and brought back a number of small ones and one fine male Rifle-bird” [Magnificent Riflebird (*Ptiloris magnificus*)] (Fletcher 1929, p. 249). June 22, all went in the launch to Evans Bay where “Masters and Spalding got some good birds (Fletcher 1929, p. 249).” June 23, “Masters and Spalding shot a few birds . . . the Doctor shot a *Cuscus* [Short-tailed Spotted Cuscus *Spiloguscus maculates*] and a lot of birds” (Fletcher 1929 p. 250). June 25, the mail steamer arrived a day early with the Sydney mail; letters were replied to and left for the next mail due in a fortnight (Fletcher 1929, p. 250).

One of the letters sent back by Macleay was quickly published in *The Sydney Morning Herald*, 27 July 1875. It reported, “We got two fine specimens of *Megapodius tumulus*” [Orange-footed Scrubfowl] at

Brooke Island. "One mound on the island must have been over 18 [~5.5 m] feet high and 100 [~30.5 m] feet round." On No. 3 Barnard Islands, George Masters shot another Scrubfowl and "a few fine rifle birds." All are working hard and collecting while we await the mail from Sydney (Anonymous 1875b).

June 26, the next heading was due north to the Torres Strait Islands and New Guinea. Macleay noted, "We had a good and favorable wind and soon lost sight of the shores of Australia" (Macleay 27 June 1875). The *Chevert* anchored in the lee of Sue Island, many birds were collected there and at Bet Island. The specimens are still in the Macleay Museum, although the literature reports are comparatively scant. Macleay again noted, "Masters got some good birds . . . and everyone got something" (Macleay 27 June 1875). One of Masters' good birds was another specimen of the white-eye (*Z. flavogularis*) = Pale White-eye (*Z. citrinella albiventris*) from Sue Island, which is the current Lectotype and others he collected from Sue and Darnley Islands are now the Paralectotypes (ABRS 2009). However, Masters (1875) described the species from specimens at Cape Grenville, a mainland site; plus Sue, Bet, Darnley, and Warrior Islands. The Macleay database shows two specimens present, one each from Sue and Bet Islands.

The objective of this second stage of the expedition was to reach the western side of the Gulf of Papua and the as yet undescribed Fly River. Macleay referred to this in his speech to the Linnean Society on the eve of his departure. "I intend in the first place to visit the large delta on the western side of the Gulf of Papua, which consists either of numerous mouths of one river, or the mouths of numerous rivers" (Fletcher 1893, p. xxxv).

June 27, arrived at Warrior Island, a small sand island described by Macleay as "a mere sandbank of small extent, and without vegetation, but the birthplace and home of the strongest, most numerous, and most adventurous of the races inhabiting the islands of Torres Straits" (Fletcher 1893, p. xxxiii). The island "produced a few small birds" [including another syntype of Pale White-eye (*Z. citrinella albiventris*)] (Macleay 29 July 1875).

June 28, set sail for New Guinea with a fair breeze and protection from the great Warrior Reef we came within sight of the New Guinea coast, just 12 miles from the mouth of the Katow River and found ourselves "in a mass of reefs in little more than two fathoms of water,

and it took five days of unremitting work on the part of the captain . . . before we finally dropped anchor about one and a-half miles from the mouth of the Katow River and village of Mohatta" (Fletcher 1893, p. xxxiii).

Local villagers came in the morning of July 3, and boarded the *Chevert* "with the utmost confidence" (Fletcher 1893, p. xxxiii). Later we landed in total 22 persons and were received by the elders of the tribe. The children of the village supplied us with grasshoppers and everything they could lay hands on. Masters shot a few gorgeous birds, but found the jungle impenetrable (Fletcher 1893, p. xxiii).

July 8, the expedition attempted to penetrate the interior along the Katow River. First through mangroves then through a forest of "a very beautiful palm, which raised its huge frond-like leaves right from the surface of the water to a height of nearly 50 feet" (Fletcher 1893, p. xxxiv). Behind this grew immense and interminable rainforest, "everything—trees, birds, &c., were new to us.," "Birds were plentiful, but could not be got at" and after about eight days stay, on July 10, Macleay gave the order to leave. Despite the comments by Macleay, suggesting that there had been rather poor collecting at Katow, many birds were obtained there, of which at least 39 are still in the Macleay Museum (Macleay Museum database).

"On Saturday evening we anchored about 5 miles North West of Warrior Island" (Macleay 19 July 1875). Macleay made only slight reference to birds collected at this locality at this time. However, George Masters and later Gregory Mathews published on some of the terns collected over the course of the expedition. George Masters collected the holotype of what he thought was a new species of tern, which he named *Sterna nigrifrons* [=Roseate Tern (*Sterna dougallii gracilis*)] (Masters 1875, p. 62-63). Masters (1875, p. 62) published *Sterna melanorhyncha* [= White-fronted Tern] (*Sterna striata melanorhyncha*), which was obtained on the same date and location. Masters (1875, p. 62) also described syntypes of his new species *Sternula inconspicua* (four female and one male, from Mud Bay, Cape York) collected 29 September 1875. Mathews (1917), having seen the male, revised the identification to [Little Tern] *Sternula albifrons sinensis*.

July 31, we anchored off "the islands of Dungeness, Long Island, Bet, Sue, Cocoanut, and York.," where we found the Torres Straits

Pigeon [Pied Imperial-Pigeon (*Ducula bicolor*)] plentiful and shot enough to feed the ship's company [these were shot on Bet Island on July 25], "It is a most delicious bird" (Fletcher 1893, p. xxxiv; Fletcher 1929, p. 254). July 19-20, the birds collected on Dungeness Island included Orange-footed Scrubfowl (Masters 1875), Great Frigatebird (*Fregata minor*), and Collared Kingfisher (*Todiramphus chloris*) (Fletcher 1929, p. 253). July 26-28, many birds were collected on Sue Island, which included more syntypes of Pale White-eye (Masters 1875). "We remained... on the north side of Darnley Island, for a fortnight, waiting for letters from Cape York" (Fletcher 1893, p. xxxiv). While considerable time was spent here few birds were collected with Macleay writing in his journal, "Birds are few and not much account" (Macleay 6 August 1875).

August 13, left Darnley Island for Hall Sound, New Guinea. "It took us five days to get to Hall Sound, calling on our way at Bramble Cay, the breeding place of innumerable boobies, noddies, and terns" (Fletcher 1893, p. xxxiv). We had weighed anchor at sunrise "and in a wonderfully short time ran the thirty miles to this place, Bramble Cay" where we collected Brown Booby, Lesser Crested Tern and Sooty Tern (*Onychoprion fuscata*), Common Noddy, Masked Booby (*Sula dactylatra*), Great Frigatebird and Silver Gull (Fletcher 1929, p. 255). July 14, anchored at Nepean Island, where Black Noddy (*Anous minutus*) were collected.

August 18, dropped anchor on the north side of Yule Island, remaining there until September 2: birds collected included a male Eclectus Parrot (*Eclectus roratus*); a new swallow [Two Tree Martins (*Hirundo nigricans*) were collected at Yule Is. It seems unlikely that Macleay, Masters and others would mistake the Tree Martin as a new species. They had collected it earlier at Cape York and unknown dates around Sydney. A specimen of Pacific Swallow (*H. tahitica*) in the Macleay Museum (B7418) with an unknown location might be a better candidate for this "new" swallow.]; a sun bird [Papuan Flowerpecker (*Dicaeum pectorale*), this species was reported by Ramsay (1878) and four specimens are held in the Museum as collected at Hall Sound.]; Pheasant Coucal (*Centropus phasianinus*), Dusky Scrubfowl (*M. freycinet*); and Metallic Starling (*Aplornis metallica*), "which is breeding in immense numbers in a gigantic tree near the village" (Fletcher 1929, p. 255). July 24, a large party went across to the

mainland..., “a number of birds were got mostly new to us” (Macleay 28 August 1875).

August 25-26, we attempted to go up the river named the Ethel, but were stopped by timber about 12 miles (19 km) up (Fletcher 1893, p. xxxv). “We got many handsome and valuable birds during our stay here, averaging in number of specimens from twenty to thirty a day, among them some fine specimens” including three male Blyth’s Hornbill (*Aceros plicatus*) and a male Southern Crowned Pigeon (*Goura scheepmakeri*) (Fletcher 1893, p. xxxv). “We saw plenty of the plumes of birds of paradise among the natives, but shot none . . . I was disappointed, however, in not getting specimens of the cassowary and tree kangaroo” (Fletcher 1893, p. xxxv).

Owing to unfavorable weather Macleay forewent further collecting and returned to Cape York via Darnley Island (Fletcher 1929, p. 256). On September 8, the *Chevert* dropped anchor near Somerset and brought an end to the New Guinea expedition. Macleay and Masters returned to Sydney on the steamer *Singapore*, departing from Somerset on 30 September 1875 (Macleay 11 October 1875; Macmillan 1957, p. 139). The *Chevert* followed arriving in Sydney about a month later.

The birds of the expedition were published in two parts, part one, the Australian birds, including the Torres Strait Islands, by Masters in 1875, (Masters 1975) and part two, the birds from New Guinea and Yule Island, by E. P. Ramsay in 1878, (Ramsay 1878). The number of birds collected from Papua New Guinea amounted to 400 specimens of 66 species (Fulton 2001); with many (26 out of the 66) first collected at Katow (Ramsay 1878). Ramsay (1878) recorded 67 numbered species, but nos. 6 and 50 are missing and there are two no. 5 giving 66 species.

The Australian birds including those from the Torres Strait Islands comprised 136 species, ten of which were considered new to science at the time (Masters 1875). Many of these were later relegated to subspecies and continue to be revised. Macleay (1875a) published (and read on 25 October 1875, before the *Chevert* had reached Sydney) on the overall success of the expedition, boasting 1,000 birds. William Macleay also reported the striking similarity of the shared avifauna; not only between New Guinea with Australia, but between New Guinea and Micronesia.

THE MACLEAYAN MUSEUM: A DECADE OF BUILDING
CONTINUES

“My Museum has been much added to. The collections made during the voyage of the *Chevert* have been now almost all removed from the original packages, the mammals and birds have been mostly catalogued and named . . . insects have been carefully laid out . . . fishes and reptiles have been bottled or . . . packed away in tanks . . . crustacea have been dried as have the echinodermata &c . . . myriads of small things have been bottled . . . shells have been catalogued. To get through all this work, I have had and still have three men fully employed Messrs Masters, Brazier and Spalding” (Macleay 26 January 1876). Specimens had been arriving while the *Chevert* had been absent with 800 birds received from Aldolphe Boucard in London, two large boxes of bird skins from Ferdinand Gruber in San Francisco, and another from Charles Pearce in Fiji (Fletcher 1929, p. 240-241). Macleay remarked that his collection had become so extensive that he had no room for it in Elizabeth Bay House (Fletcher 1929, p. 257). Thus, he commenced construction of a building to house his collections, writing in his journal, “One of my leased pieces of land in the garden [is] to be used as a Museum, it is 115 feet long, 36 feet wide, 9 feet high and made chiefly of iron, the cost is to be £1,080” (Macleay 26 January 1876). The museum was completed in 1876, its shell was finished and moving in commenced in late May 1876. The museum came to be known as the Macleayan Museum (Fletcher 1929, p. 259). Total costs for the museum passed Macleay’s initial expectations, costing more than £1,200. Most of collections were moved in that year, except for the invertebrate collections, which remained in Elizabeth Bay House. In planning for the move, a carpenter had been hired for the sole purpose of building glass topped cases and cabinets: the bill for the glass alone amounting to more than £33. Another five cabinets, “three for large birds,” all built to specification, were supplied by the builder, at £160 (Fletcher 1929, p. 258-259).

Macleay had hired “Messrs Masters, Brazier and Spalding” to work in his new museum (Macleay 26 January 1876), Spalding and Masters predominantly on birds. During February 1876, Macleay and company continued building, and sorting specimens. Spalding shot, stuffed and mounted birds.

In 1879, Macleay was distracted from adventure and collecting, becoming preoccupied with preparations for the International Exhibition to be held at the ill-fated Garden Palace. The Exhibition attracted many international visitors, including naturalists. This provided important opportunities for Sydney's scientific community to engage with a variety of academics. The Macleayan Museum at Elizabeth Bay was a focal point for Australian and overseas naturalists, including Julius von Haast and James Hector from New Zealand, noted for their important exchanges with Macleay. Edgar Leopold Layard, British Consul at Noumea, came to see the Museum, especially the birds from the New Hebrides. He subsequently sent two collections of New Caledonian birds (Fletcher 1929, p. 266).

Macleay continued accumulating a vast natural history collection with the intent of providing for prosperity a gift to the people of Australia generally and, more specifically, for a medical school and naturalists. No energy was spared in his pursuit of amassing the greatest natural history collection in Australia, and all the while he worked with and for the Australian Museum for equivalent goals.

The last words on William John Macleay are given here by his employee, confidant and friend, the determined champion of his life and works, J. J. Fletcher.

“Among Australian public benefactors whose names are deservedly held in honour and esteem, William Macleay occupies a niche entirely his own. He was pre-eminently the Patron of Natural Science in Australia; and as such he was a worker as well as a giver. And splendid though his benefactions were, amounting from first to last to about one hundred thousand pounds, . . . in his example and in his long-continued personal service without fee or expectation of reward, . . . actuated simply by a sincere desire to see the land of his adoption, . . . attain the full measure of its intellectual as well as of its material development.”

The honour of Knight Bachelor was conferred upon Sir William John Macleay in 1889. He died on December 7, 1891, in his 72nd year (Fletcher 1893, p. 1-li).

Gift and Betrayal.—In 1879, William Macleay gifted the Macleay Museum in its expanded form to The University of Sydney along with

other considerable cash donations and an extensive and valuable library, all bound in a new and grand building (Figure 3). The university accepted the gift then reclaimed the building for office and student space retiring some collections to an attic and dispersing others around the university and further afield – against the wishes of Macleay and after his death.



Figure 3. The Macleay Museum grandly standing in the morning sun ca. 1895: the University's Great Hall is to the left of the frame. Courtesy of the Macleay Museum, University of Sydney.

Prelude to the Macleay Museum.

The University of Sydney had long desired a museum of its own. Natural history museums were synonymous with medical schools at universities and the field of natural history had been in an ever-

expanding phase since the gentleman's cabinets of Alexander Macleay's youth.

In 1852, an extraordinary request was received by the Australian Museum from the Secretary of the Senate, at the direction of the Vice-Provost (Vice-Chancellor) of the University of Sydney. The University had requested a meeting between committees of their Senate and the Australian Museum. Robert Etheridge (1919, p. 366-367), Curator/Director of the Australian Museum, published the transcripts of the letters exchanged between the university and the museum.

“ . . . upon what terms the Museum and grounds might be transferred to the University of Sydney, and of course to ascertain primarily whether any propositions would be entertained by the Committee of the Museum.”

The Museum's response was blunt and to the point:

“It was unanimously resolved that its acceptance would be detrimental to the interests of the Museum, whilst, moreover, it is one which the Committee, under its present constitution, is not competent to entertain.”

As another major museum was unlikely to materialise in the short term, the university let the idea wane. They could not have imagined the luck that would befall them in another two decades. A private museum with world-class collections that predated both the Australian Museum and the University of Sydney was becoming available, almost literally at their doorsteps.

In 1863, William Sharp Macleay's perspicacity at identifying in his younger cousin the growing qualities of enthusiasm and ability in natural history led his decision to hold off the bequest of his museum to a university for one more generation. Thus, a new Will was drawn up with a codicil added in which William Sharp bequeathed his and his father's collections to his cousin William John, until, at latest, the death of William John Macleay. The codicil was signed by William John on 24 May 1863 (its wording is appended to Holland 1996). According to it William John agreed to care for the collections and neither add nor subtract from them. In addition, either upon his death or before, the collections must be passed to either The University of Sydney or Cambridge University in England (Holland 1996; Stacey and Hay

2007, p. 27-28). The codicil had no relevance to William John adding to his own collection.

Thus, on William Sharp Macleay's death in 1865, the Macleays' natural history collections passed to William John, although Elizabeth Bay House and most of the contents, including the library, went to his brother George Macleay as residuary legatee (Fletcher 1920). However, George Macleay lived abroad from 1859 in Surrey, England, and in the south of France, and thus leased the house and land to William John for 99 years (Historic Houses Trust 2010).

The Grand Museum.

Near the close of 1873 William John Macleay wrote to the Senate of The University of Sydney to inform them of his wish to bequeath the Macleay collections. Their formal reply came in the form of a public announcement on 28 March 1874. The Chancellor, The Honourable. Sir Edward Deas-Thomson, announced the acceptance of Macleay's bequest to the Senate. He stated that William Macleay intended to bequeath "his valuable library and collection of natural history, upon trust for the promotion of that science, and the instruction of the students and the inhabitants of the colony" and the sum of £6,000 with its interest to provide for a curator. The library then consisted of about 2,000 volumes, to which Macleay was continually adding, and included many books from the late William Sharp Macleay's library given by George Macleay (Fletcher 1929, p. 220-221, 235-236). The Sydney University Calendars show that that the university recognised the bequest in 1874 when Macleay undertook to leave his natural history collection, along with an endowment for the stipend of a Curator, as soon as a suitable building was provided and given the following conditions:

- 1) that the present Curator should be continued in office,
- 2) that the endowment of £6,000 for the salary of a Curator should be used for this and no other purpose, and
- 3) that the Museum should be made easily accessible to students of natural history and members of the Linnean Society of New South Wales.

"Under these conditions the Senate gratefully accepted Mr. Macleay's gift" (The University of Sydney 1890).

On April 11, 1874, following the university's announcement, the family agreement and William John's bequest were publicly announced

in *The Sydney Morning Herald* and a formalised name was given to the collections that comprised this magnanimous gift—the collections were henceforth to be known as The Macleay Museum (Anonymous 1874a,b).

William Macleay changed his mind and decided to present his natural history museum to the University in his life-time instead of as a testamentary bequest. He made the new offer in 1884. This was formalised when a building to house the museum was finished, as were Macleay's conditions, by a vote in of the University's Senate on 1 October 1888 (Anonymous 1888).

The Macleay Building was designed by George Allen Mansfield, a private architect, who also designed the Prince Alfred Hospital. The construction of the Macleay Museum building must have started in 1887, given contracts were signed in December 1886. It was designed to display and protect the massive Macleay collection (Figure 4a and 4b). At the time of the presentation of the Macleay Museum, its collections were numbered around 100,000 specimens without including the insects. In addition, there were more than 10,000 type specimens (Stacey and Hay 2007, p. 45). Professor William Haswell reckoned, in his litany of specimens, more than 10,000 birds (Haswell 1891). The collection alone, when offered to The University of Sydney, was roughly assessed at £25,000 (Barff 1902, p. 120), and £47,000 including the building (Fletcher 1921). But given the extent of the specimens, this appears to be a gross underestimate. The collection was richest in Australian fauna of "almost every department," (Fletcher 1893, p. xlviii).

In 1891, after the move into the new Macleay Museum was completed, Professor Haswell reported to The Linnean Society of New South Wales at their annual Presidential Address the news that William John Macleay had passed away.

Betrayal.

In short time, the museum collections were packed or given away. What remained was sealed in an attic at the mercy of extreme temperature fluctuations and without ventilation—an unsuitable environment for the storage of valuable biological specimens. George Masters died in 1912. Three years later the infringements on the museum intensified in a rush to take over the Macleay Museum's most sought after property—space. The building was converted in 1915 into

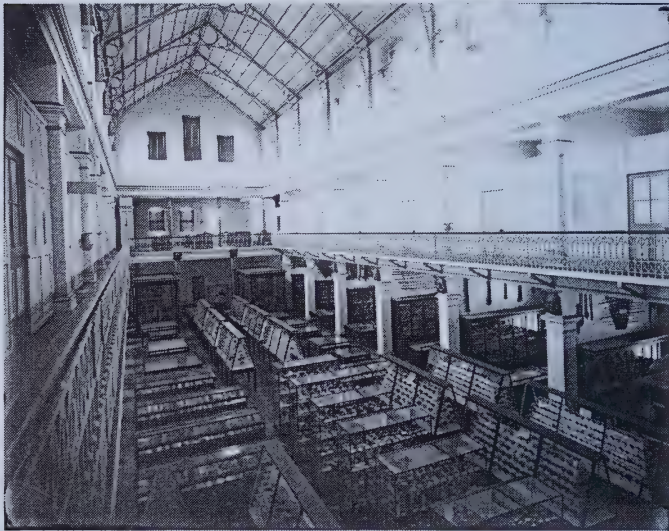


Figure 4a (top). Interior view of the Macleay Museum c. 1893 with some large white casts temporarily held for the Nicholson Museum. The large cabinets containing the cervids and macropods in the Museum's central court were later removed to the Australian Museum. Courtesy of the Macleay Museum, University of Sydney.

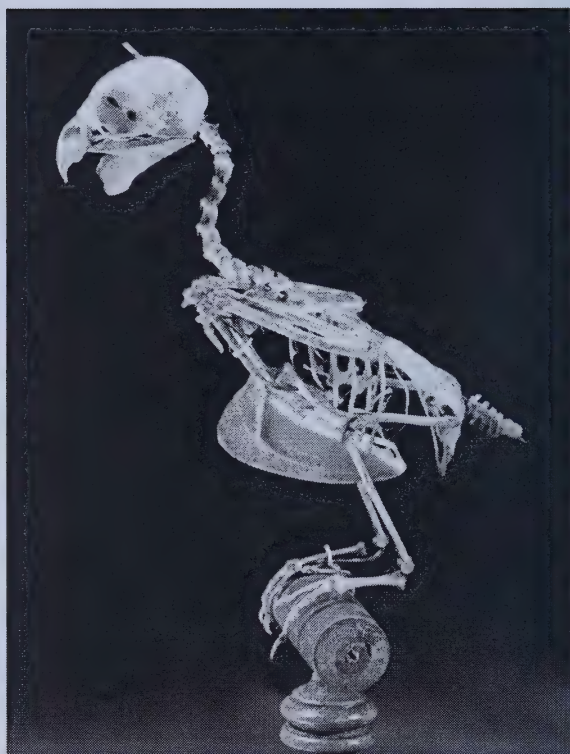
Figure 4b (bottom). Interior view of the Macleay Museum 1915-1917: by this time the first floor gallery had been subdivided into offices with corridors supported by brackets. The central court now displays a collection of geological specimens. Courtesy of the Macleay Museum, University of Sydney.

a two storeyed Botany and Geology building (Stanbury and Holland 1988; Patterson 1995; Stacey and Hay 2007). The battle for this space continues. In the 1990s, when I was a student there, professors and junior staff alike were still competing for any available room.

There were objections, of course. J. J. Fletcher, President of the Linnean Society of New South Wales drew attention to the failure of the University to uphold the legal trust that had fallen upon them as *ipso facto* trustees to William Macleay's stated conditions under which they had accepted his gift. He testified to the movement of specimens out of the museum. He questioned whether this was not the subtraction of specimens that William Sharp Macleay had been concerned with and had forbidden in the codicil appended to his final Will and Testament. Fletcher's protests were even published in the *Sydney Morning Herald* (Anonymous 1921), but with no effect on the university's decision to effectively dismantle the Macleay Museum.

BIRDS OF THE MACLEAY MUSEUM

The Macleays' involvement with bird collecting began with Alexander Macleay. He built up a bird collection in England, buying and exchanging specimens for his celebrated cabinet, and later in Australia, with his sons George and James, from where they sent specimens to societies and friends in England (Fletcher 1921, p. 577, 580) and to a lesser extent donated to the Australian Museum (Bennett 1837). Alexander's eldest son, William Sharp Macleay, also collected birds and is recorded sending birds from Cuba to Nicolas Vigors in England (Vigors 1827; Fletcher 1920, p. 602). Vigors (1827) noted that in addition to the 45 species that William Sharp had sent from Cuba that there were damaged specimens and specimens of young birds, which he did not describe, further commenting that these probably added to the total number of species that had been sent. Alexander's nephew, William John Macleay, gets the credit for the bird collection that is now held in the Macleay Museum. He built it up significantly in order to enhance his gift of the Macleay's Collections to The University of Sydney and to make the collection more comprehensive, diverse, and more broadly suitable for tertiary education and general research (Anonymous 1874c; Fletcher 1893, p. xxx).



The Macleay Museum has an extensive collection of study-skins and mounted specimens, skeletal material, eggs, and nests (Fulton 2001). While the skins are well identified, the skeletal, egg, and nest collections are largely unidentified (Fulton 2001). The size of collections within the bird collection were estimated in 2005 as study skins 5,000, mounted birds 2,200, bones 500, fossils 100, specimens in alcohol 100, eggs 1,500, nests 100, and other 500—a total of 10,000 specimens (Gill 2006).

The bird collection holds significant historical importance, with most of the specimens collected in the 19th century (Fulton 2001). In addition, there are many type specimens in the collection of species and subspecies (Masters 1875; Ramsay 1875a,b,c, 1877a, 1878, Stanbury 1969, Longmore 1991, Fisher and Longmore 1995, Fulton 2001). However, many of the bird types noted by Stanbury (1969) were moved to the Australian Museum, some of these may still be in the Macleay Museum (Longmore 1991, Fulton 2001). Notably, about eight percent of the bird specimens are of species listed as threatened or extinct (for a detailed list see Fulton 2001). In addition, the collection contains many rare and unique specimens, such as the only complete skeleton of the extinct Paradise Parrot (Figure 5a) and study skins of both genders (Fulton 1998a, Fulton 2001); Dodo (*Raphus cucullatus*) and many moa (Emeidae) skeletal parts; one of only 24 Night Parrots (*Pezoporus occidentalis*) (Figure 5b), and one of about six Lafresnaye's Rails (*Gallirallus lafresnayanus*) in the world's museums (Forshaw et al. 1976, Fulton 2001, McDougall et al. 2009). From New Zealand there are skins of nine Huia and 20 Kakapo (*Strigops habroptilus*), the latter representing 10% of the world's specimens (Fulton 2001).

All orders, 80% of families, and over half of the world's genera are represented with many specimens of Melanesian, Micronesian, and Australian origin. There is a broad geographical coverage with

Figure 5a (left, top). Mounted skeleton of the Paradise Parrot (*Psephotus pulcherrimus*). This is the only known skeleton of this species in the world (Fulton 2001). Courtesy of the Macleay Museum, University of Sydney.

Figure 5b (left, bottom). The skin of the Night Parrot (*Pezoporus occidentalis*) with a George Masters label; this specimen was sent to the Macleay Museum from the South Australian Museum on June 30, 1876; it was probably collected by F. W. Andrews in the Gawler Ranges near Lake Eyre. The Night Parrot is rarely detected with no living bird collected since 1912 (Forshaw et al. 1976) and no photographs of a live bird ever taken. Photo G. Fulton.

Palearctic, Nearctic, and Neotropical birds; the last includes a substantive series of hummingbirds (Trochilidae). The least well covered biogeographical realms are Africa and Antarctica (Fulton 2001, Gill 2006).

The condition of the bird collection.—Despite being kept in uncontrolled conditions, the bird collection in the Macleay Museum has often been assessed as in good condition. Held in specially built storage cabinets and kept in the dark for over 100 years, the specimens have retained good color and condition (Phipps 1988, Fulton 2001). However, these statements were given without detail and the generalized evaluation of “good condition” is at odds with a study undertaken on the condition of a sample of the skin collection, which found 71% in good condition, 20% in fair condition, and 9% in poor condition (Fulton 1999). Disappointingly all the Huias in the collection were extensively damaged, with some falling apart (Fulton 1999). On 4 September 1879, William Macleay received a consignment of birds, from James Hector, Director of the Colonial Museum of New Zealand and Geological Survey in Wellington. These included a number of Huias. Macleay opened the box the next day and reported in his journal, “Hector’s bird skins turns out to be riddled and destroyed by the larvae of a Hister” (Macleay 5 September 1879). Hister beetles are carnivorous and are considered extremely destructive. The damage seen in the Huias today is undoubtedly similar to the condition in which they arrived at the Macleay Museum. The Huia was a rare bird in New Zealand even before Europeans arrived. Thus, Macleay realising their value even in such poor condition, kept them. The nine Huia in the museum were collected from Tararua Range near the south eastern corner of the North Island. They are now extinct and have not been seen since 1907 (Myers 1923, Birdlife International 2008). A single Huia feather sold at auction recently for \$6,470.00 AUD a world record price for a feather (ABC Online 2010).

Specimens of other species are missing (Fulton 1999, Fulton 2001). Gregory Mathews (1917) wrote on the condition of the Macleay birds he examined, “It was therefore with the greatest of sorrow that I saw the ruin in connection with the bird skins still conserved in that Museum. Names I had noted were represented by the specimens in bad condition and I was horrified at their uncared-for state. The collectors who brought together these specimens might claim a share in my grief,

but this would not appear to have been the case as the chief collector, the late George Masters, was afterwards curator of the Museum.” Clearly, Mathews did not think the collection was in good condition nearly 100 years ago, nor did he seem enamoured with George Masters as the curator of the collection. In 1998, specimens were overcrowded and were damaged as drawers were opened or closed. Sheets of plastic had been placed over the specimens to help avoid this damage, but they proved of limited practical value. Other specimens were flattened on one side by sitting directly on the hard steel drawer; placing a cushioned lining between the hard surface and the specimens would have ameliorated this problem, a practice then followed at the Australian Museum (Fulton 1999).

Collection database and labels.—On the whole, the geographic localities presented in the Macleay database for the specimens matched the expected ranges of taxa (Fulton 1998b). However, many localities are too general to be useful. Many localities appear to be a dispatching site rather than a collection site. For example, a specimen of the hummingbird, the Merida Sunangel (*Helianthus spencei*) (B617), has the locality “Colombia.” This is from where it was dispatched—it occurs in north-western Venezuela. Many of George Master’s labels had become separated from their specimens. Given the often ambiguous nature of these labels, with localities such as “King George Sound” or “Australia,” it will not be possible to reunite them with the correct specimens (Fulton 1999). More labels have been lost since 1988 when Graeme Phipps electronically catalogued and re-housed the collection in modern cabinets. The localities on his secondary labels indicated that a primary Masters’ label had previously been with the specimen, but in some cases this was found to be missing. In addition, some rare specimens lost their labels during the Australian Museum’s Online (AUMOL) project that photographed birds so that the images could be uploaded to the Internet (Fulton 1999).

Skeletal, egg, and nest collections.

Skeletal and fossil material.

The moa ornithological material is presumed to have been obtained from Julius von Haast of the Canterbury Museum through exchange with George Masters in 1876 (Tilbrook 1992). Originally there were many complete skeletons, which over time have been

dispersed throughout the university, with only remnants held in the museum (Tilbrook 1992, Fulton 2001). These skeletons were unlikely to have been assembled from single individuals; although they were not perfect they were in the most part completed from skeletons recovered close together at a single site, as was the practice of the time (Haast 1869; Barton 2000). Macleay's journal states that two cases arrived from von Haast, "34 species of New Zealand birds" arrived in one case and the other was full of Moa bones (Macleay 9 March 1876).

While the skeletal material in the Museum needs closer study, significant material has been identified, including five species of moa, Little Spotted Kiwi (*Apteryx owenii*), the extinct South Island Goose (*Cnemiornis calcitrans*), Paradise Parrot, and Dodo (tarsometatarsus, tibiotarsus and femur) (Fulton 2001) (Figure 6). Fulton (2001) gives



Figure 6. Graham Fulton studies skeletal parts (tarsometatarsus, tibiotarsus, femur, sternum, pelvis, and lower jaw) of the Dodo *Raphus cucullatus*, which were on display in the Macleay Museum. Courtesy of the *Fairfax Sun*, 9 September 1997.

details on the skeletal parts held linked to a list of threatened species extant in the museum. There is also a collection of unlabelled or incorrectly labelled bird sterna (personal observation). These were most likely taken from specimens prepared by Masters and Spalding and warrant further investigation.

Nests and Eggs.

Little information has been found relating to the nests and eggs in the museum, yet there are many specimens of historical and scientific interests. For example, the *Chevert* Expedition mentions the collection of many eggs. Ramsay worked closely with the Macleay Museum when describing new species, nests or eggs; he frequently supplemented the collection available to him at the Australian Museum with specimens held by William Macleay, which allowed more accurate descriptions or the addition of nidification details. Longmore (1991) gives one example where Ramsay (1876a) described a type series of *Pachycephala kandavensis* skins (Ramsay 1876a) [Golden Whistler (*Pachycephala pectoralis kandavensis*)] and also described an egg taken from the nest of a type female. Ramsay (1887) also described eggs of *Sphenura longirostris* [Western Bristlebird (*Dasyornis longirostris*)] and *Eopsaltria gularis* [Western Yellow Robin (*E. griseogularis*)], which were collected by George Masters at King George Sound, Western Australia.

Ramsay (1883) described nests and eggs of eight New Guinea species (possibly all for the first time), which were acquired by the Macleay Museum from Andrew Goldie's expedition (ca. 1879). Each species' account was annotated as either "(Mr Macleay's Coll.)" or "(Macleay Coll.)". Ramsay (1883) described *Manucodia atra* [Glossy-mantled Manucode (*M. atra*)] 2 eggs; *Paecilodryas albifacies* [White-faced Robin (*Tregellasia leucops*)] nest and 2 eggs; *Eupetes ajax* [Painted Quail-thrush (*Cinclosoma ajax*)] eggs; *Paradisea raggiana* [Raggiana's Bird-of-Paradise (*Paradisaea raggiana*)] nest and egg/s [not explicitly stated as Macleay's collection, although it probably was]; *Talegallus pyrrhopygius* [Wattled Brush-turkey (*Aepypodius arfakianus*)] egg/s; *Goura d'Albertisi* [Southern Crowned Pigeon (*G. scheepmakeri*)] eggs; *Casuaris (beccari ?)* [Southern Cassowary (*C. casuaris*)] egg; and *Rectus ferruginea* [Rusty Pitohui (*Pitohui ferrugineus*)] eggs. Tibbrook (1992) states that parts of Goldie's material from the Macleay Museum were transferred, ending up at Museum

Victoria, although she states without elaborating that some of the birds remained with the Macleay Museum.

Perhaps the earliest donation of an egg to the Macleay Museum came in 1874 from Professor H. N. Moseley, one of the scientific staff of the *Challenger* Expedition that stopped over in Sydney. He gave William Macleay an egg of Yellow-nosed Albatross (*Thalassarche chlororhynchos*) (Fletcher 1929, p. 233). This egg surely came from Tristan da Cunha, where the *Challenger* collected and gathered many of these eggs (Moseley 1879, p. 134).

A. J. (Archibald James) Campbell and A. J. (Alfred John) North both produced monumental works on the nests and eggs of Australian birds (Campbell 1901a,b, North 1901-1914). These provide useful leads to the nests and eggs in the Macleay Museum by reconstructing precise geographic locations, which were lost along with primary labels in the Macleay collections. For example, Campbell (1901a, p. 178) cites North (1901) as noting that a nest of Blue-breasted Fairy-wren (*Malurus pulcherrimus*) or Black-backed Superb Warbler (*Malurus assimilis*) [Variegated Fairy-wren (*Malurus lamberti assimilis*)] was collected by Walter William Froggatt (who collected for William Macleay in the Kimberley region of north-western Australia) on 25 January 1888 at the Napier Range in Western Australia. North (1912, p. 352) described the nest and eggs of the Brown Gannet (*Sula sula*) [Brown Booby *Sula leucogaster*] taken at Bramble Cay, Torres Strait. He was apparently quoting from Macleay's expedition, although I have found no mention of this species' nest or eggs in Macleay's journal or for any species at Bramble Cay (Macleay 13 August 1875). Measurements for two eggs of this species in the Macleay Museum are given by North. Again from the *Chevert* Expedition, Masters informed North that a Wompoo Fruit-Dove (*Ptilinopus magnificus assimilis*) was flushed from its nest, which was collected along with an egg (from a clutch of two) and the bird (North 1913-1914, p. 105). With many original labels lost in the Macleay collection, snippets of information like this can add to the quality and history of the collection.

Six entries regarding nests are given in Macleay's private journal: some bird nests from Tasmania were sent by Petterd (Macleay 27 October 1876); an edible bird's nest was obtained via John Archibald Boyd from Fiji (Macleay 26 September 1879), this is undoubtedly from the White-rumped Swiftlet (*Collocalia spodiopygius*), and Fletcher gives others sourced from Macleay's personal journal of 1874 with

entries of a pardalote (*Pardalotus* spp.) and its nest from the “Old Garden” at Elizabeth Bay; two nests with eggs of Australian Reed-Warbler (*Acrocephalus australis*) from the Baptist’s Gardens; a honeyeater (*Melithreptus* sp.) with a cuckoo nestling, and a nest with eggs of Superb Fairy-wren (*Malurus cyaneus*) (Fletcher 1929, p. 228, 233). The “Old Garden” may have been quite productive in producing eggs for the museum as Stacey and Hay (2007, p. 33) state that “an extra-long ladder” was acquired to assist Masters in obtaining these eggs.

BIRDS OF ALEXANDER MACLEAY

In England.—The earliest reference of any bird associated in some way with Alexander Macleay (Figure 7) was in a letter written to him in 1801 by James Edward Smith, President of the Linnean Society and the purchaser of Linnaeus’ collections. Smith wrote, “You may expect a visit from a countryman of mine on Sunday the 20th December. . . . my friend is a Norfolk Turkey.” The Turkey (*Meleagris gallopavo*) was a gesture of sincere thanks on Smith’s part for Alexander Macleay’s efforts as Secretary of the Linnean Society (Holland 1988).

Birds were part of Alexander Macleay’s collection from an early time. Like other collectors, he sold and swapped duplicate specimens. Surviving auction catalogues and the annotations in them tell something of the early transactions in birds. In one example, Macleay sold eighteen lots of “Skins of Birds” at auction through King & Lochée, at their rooms in King Street, Covent-Garden, on Friday 6 May 1814. These included hummingbirds (Trochilidae), a Titmouse of Paradise [Paradise Tanager (*Tangara chilensis*)], an exotic goat-sucker (Caprimulgidae) and parts of two different toucans (Ramphastidae). The 18 lots earned £28.8.6, which after charges and commissions left Macleay with £25.15.0 (Holland 1988). William Elford Leach, of the British Museum, described two bird species from specimens in Alexander Macleay’s Cabinet in London: Lineated Shrike (*Lanius lineatus*) [Fasciated Antshrike (*Cymbilaimus lineatus*)] from Guyana, South America, and Pheasant Coucal (*Polophilus phasianus*) [(*Centropus phasianinus*)] from Australia (Leach 1814, p. 20, 116).

José (1933) states that the Pheasant Coucal was from Mount Warning, Australia. José stated this in a newspaper article, which did



Figure 7. Alexander Macleay (1767-1848). Courtesy of the Macleay Museum, University of Sydney.

not explain the geographical location, though the species did and still does commonly occur there. However, it was written by Arthur Wilberforce José (1863–1934) a noted historian who had lectured at The University of Sydney and published widely (Lamont 2011). Leach (1814, p. 116) gives no indication of a collection location for Alexander Macleay's Pheasant Coucal, he does provide its location when he

described it as “Mus. Dom. Macleay”, which indicated it was domiciled in Macleay’s museum or cabinet. During the rationalisation and disposal of the Linnean Society’s Museum a Pheasant Coucal (most likely Macleay’s) was sent to auction with many other specimens, and sold in lot No. 118, a lot of 15 birds, for 7 shillings (Stevens 1863).

George Such described some new birds from Brazil among which was a shrike (*Thamnophilus maculatus*) [Variable Antshrike (*T. caerulescens*)] from Macleay’s cabinet (Such 1825). These reports provide evidence that Alexander Macleay acquired Australian and South American birds. Fletcher (1921, p. 577) suggests that the skins mentioned by Leach and Such were likely included in Alexander Macleay’s first two donations to the Linnean Society of London.

At least three donations from Alexander Macleay to the Linnean Society of London were recorded in their Transactions and other sources, while he still resided in England: 34 skins from Berbice, May 1807 (Linnean Society of London (General Minute Book) 1807, p. 5; Linnean Society of London 1811, p. 413) and 11 and six specimens from New South Wales (Linnean Society of London 1818, p. 598; 1822, p. 636). Each lot had species new to the Linnean collection (Fletcher 1921, p. 577). On 21 June 1825 and 17 January 1827, Nicholas Aylward Vigors and Thomas Horsfield read their publication, *A Description of the Australian birds in the collection of the Linnean Society* (Vigors and Horsfield 1827), in which they expressed their great expectations that the knowledge of Australian birds would be greatly enhanced by Alexander Macleay during his future residence and “researches” in Australia—they were referring mostly to the supply of specimens (Horsfield and Vigors 1825, p. 176-177; Vigors and Horsfield 1827, p. 259). They described the Linnean collection as having, “already received, and which it is expected will continue to receive, so much benefit from Mr. MacLeay” (Horsfield and Vigors 1825, p. 176-177). Alas, in their lengthy publication, they failed to report on specimens that had come from Alexander Macleay. They chose instead to focus on those acquired from George Caley and Robert Brown, because these had accompanying manuscripts or location data. The sale of birds at auction, reports of birds in the literature, and the donation of birds to the Linnean Society show that Alexander Macleay was in receipt of birds from around the world while still in England.

On the voyage to New South Wales.—It is possible that a Wood Pigeon (*Columba palumbus*), wagtail and European Robin (*Erithacus rubecula*) were added to Alexander's collection not long after quitting England and before any landfall was made. Fanny Macleay wrote to her elder brother William Sharp that on the voyage to Australia, after leaving the channel, heading westwards and well away from land, a Hawk Moth (*Sphinx atropos*) that had flown onto the ship was presented to her father by the Captain, "he is anxious to oblige us in everything . . . a wagtail alighted on the Vessel . . . and continues with us—Papa saw a Wood Pigeon on board yesterday and a robin. Poor things, we know where they are now" (Earnshaw et al. 1993; 31 January 1826).

New South Wales.—Within only months of Macleay's arrival in colonial New South Wales letters were arriving from England requesting he send back natural history specimens (Stacey and Hay 2007, p. 16). In due course, Macleay dispatched birds to the Linnean Society of London, including 41 and 54 "skins of birds from New Holland" (Linnean Society of London 1827, p. 532-533) with the 54 bird skins arriving 1 November 1827 (Presents Book) "34 bird skins from New Holland, most of them not before in the Society's collection" (Linnean Society of London 1829-1833, p. 794), 16 April 1830 (Presents Book); and a collection of bird skins and insects (Linnean Society of London 1837, p. 597), 17 October 1833 (Presents Book). The Presents Book (1772-1799; 1822-1861) recorded donations to the Linnean Society of London. The large gap in its records may represent either a missing book or data, which was not collected during that period (Wheeler 1995).

A letter read to the Zoological Society on 12 May 1835 (but dated 25 October 1834) stated that a single Kiwi (*Apteryx australis*) was donated to the Zoological Society of London (Macleay 1835; Zoological Society of London 1836, p. 18); it was only the second to be presented in Europe (Anonymous 1838). The same letter gave notice of Alexander Macleay's intention to send live white-fleshed pigeons of the colony for acclimatization because they apparently tasted far superior to the Grey Partridge (*Perdix perdix*). All bird shipments sent back to England were reported as donations from Alexander Macleay, Colonial Secretary of New South Wales.

Another species of interest in the Macleay story in the Linnean Society's collection is the Satin Bowerbird (*Ptilonorhynchus violaceus*). In 1822, prior to Alexander Macleay leaving for Sydney, John Latham reported several in the Museum of the Linnean Society of London (Latham 1822). Later Vigors and Horsfield (1827) described it and named the species *Ptilonorhynchus macleayii* in honor of Alexander Macleay, "uniting with" John Latham. Latham (1822), however, does not mention Macleay or indicate any intention to give a species epithet as either *macleayii* or otherwise. I presume then that this quote alludes to a personal communication. In their description Vigors and Horsfield refer to the "late respected Secretary of this Society" implying that Macleay had left England (Vigors and Horsfield 1827, p. 263-264). Stacey and Hay (2007, p. 16) report, without referencing, that among the birds Alexander Macleay dispatched to England was "a beautiful bowerbird," presumably one of those discussed above.

Early British museums.—The Museum of the Linnean Society of London no longer holds the specimens donated by Alexander Macleay and the Zoological Society Museum no longer exists, having been dispersed in 1856. The Museum of the Linnean Society of London was dispersed by 1863 (Wheeler 1995). Gage and Stearn (1988) state that some of Macleay's collections held by the Linnean Society went to the British Museum now the Natural History Museum, Tring; however, the only Australian bird from Alexander Macleay extant in the Tring collection is specimen No. 9584, a male Scarlet Honeyeater (*Myzomela sanguinolenta*). Macleay's birds were not intended to go to the British Museum. On 16 June 1863, J. Grey and P. Sclater, employed for the purpose, advised the Linnean Society that only 15 type specimens of Temminck, 72 specimens described by Vigors and Horsfield (mostly Caley's and Brown's birds) and four non-types worth preserving should be sent to the British Museum (Wheeler 1995). Much of the remainder of the collection had been poorly curated and was in poor condition. These specimens were not thought suitable for the British Museum and were subsequently auctioned off (Wheeler 1995).

By 1812, committees were established to organize the Linnean collections, with Alexander Macleay working with insects (Wheeler 1995). Larger specimens such as birds required preservation and were

sent to the firm of John Leadbeater Taxidermist (Ornithologists to Her Majesty and the Royal Family) of 19 Brewer Street, Golden Square. These were typically in poor condition, having been attacked by insects and needed the physical protection of being mounted and placed into glass cases. Many were not expected to last long and were to be sold at auction. On 31 March 1819, 11 birds of 10 taxa from Alexander Macleay's donations were sent with a penguin; more specimens from Alexander Macleay, when he was the Colonial Secretary of New South Wales, were sent in May 1836 (Wheeler 1995). In 1863, The Linnean Society sent 132 lots of birds (in 268 advertised lots), which mostly comprised mounted Australian birds, "spiritedly set up in mahogany frame glass cases," to J. C. Stevens auctioneers, which were sold on 10 November 1863 (Stevens 1863).

The Zoological Society's Museum was dispersed by 1856 (founded merely 30 years before) to various institutions and to private collectors with many type specimens lost. During its short lifespan this museum's collections of vertebrate specimens had rivalled the British Museum in quantity and taxonomic value (Wheeler 1997), once housing 4,000 birds, including many type specimens.

Alexander Macleay's Kiwi was mentioned in the Zoological Society of London (1836, p. 18). Another 48 bird skins from New Holland from George Macleay, noted in the Zoological Society of London (1833, p. 14) were probably sent in 1832. William Sharp Macleay also donated birds and other taxa, including type specimens, from Cuba to the Zoological Society (Waterhouse 1838; Fletcher 1921, p. 602).

Among birds that Alexander Macleay sent back to London were the type specimens of Sir J. E. Smith's Pigeon (*Columba smithii*) [Partridge Pigeon (*Geophaps smithii*)] and Forest Kingfisher (*Halcyon Macleayii*) [(*Todiramphus macleayii*)], first described by William Jardine and Prideaux John Selby in 1830. Jardine and Selby based their descriptions of both on single specimens received from Macleay when he was Colonial Secretary. Their plate of the Partridge Pigeon shows the "deep crimson-red" orbital skin of birds from Arnhem Land (Jardine and Selby 1830, plate civ; Fisher and Calaby 2009, figure 105). The holotype of the Forest Kingfisher, collected by Macleay in "New Holland," was once in the collections of the Linnean Society of London, but neither this kingfisher nor the pigeon can now be found. Fisher and Calaby (2009) state that both specimens were likely to have

been collected in the Cobourg Peninsula area of the Northern Territory before 1830 (Fisher and Calaby 2009, p. 115-177 and figure 105 (Partridge Pigeon); p. 140-141 and figure 8 (Forest Kingfisher)).

Alfred J. North (1901-1904, p. 52) points to other Alexander Macleay specimens described by Jardine and Selby including Great Bowerbird (*Chlamydodera nuchalis*) [*Ptilonorhynchus nuchalis*]. In their description of *Halcyon macleayi* (plate ci) [Forest Kingfisher], which is given two plates before the Great Bowerbird, Jardine and Selby suggest that the type specimens of the latter species were obtained from Alexander Macleay. They wrote, "This beautiful species (*H. macleayi*), with some of the subjects on our following plates, have lately been added to the collection of the Linnean Society by the zeal and industry of Alexander Macleay, Esq., who though advanced in years, and far distant, remains still indefatigable in promoting the welfare of the Society where he so long and faithfully performed the duties of Secretary" (Jardine and Selby 1830, North 1901-1912).

Early Australian Museum.—George Bennett (1837) listed bird specimens in the early Australian Museum, documenting the presenters, where known. Alexander Macleay is noted three times, George Macleay once, and Mrs. Macleay (Elizabeth) twice; in total ten specimens are credited to the Macleays. It is not known how Alexander Macleay obtained the specimens he donated to the Australian Museum, although the Australian birds may have been acquired locally and from his good friend Robert Brown, who had collected at King George Sound, 8 December 1801- 4 January 1802, on board the *Investigator* (Flinders 1814). If the latter is true it would provide evidence that Alexander Macleay brought bird specimens with him to Australia. Robert Brown (1773-1858) was an eminent botanist whose papers sent to Alexander Macleay were inscribed to his "affectionate friend" (Fletcher 1921, p. 578). Robert Brown had also once been a suitor of Fanny Macleay (Alexander's daughter), remaining a life-long friend and correspondent of hers (Stacey and Hay 2007). His birds were donated to the Linnean Museum in London. Some or all of Brown's birds from that collection were to be forwarded to the British Museum (Wheeler 1995).

The non-Australian birds, given in Bennett (1837), presented by the Macleays may have been acquired from ships visiting Sydney or by Alexander Macleay in England. The species presented by the Macleays

were: Australian Ringneck (*Barnardius zonarius semitorquatus*) from King George Sound, by Alexander Macleay, p. 31; Australian Little Bittern (*Ixobrychus dubius*) from Botany Bay, by Alexander Macleay, p. 45; Australian Painted Snipe from Cowpastures, [in western Sydney], by George Macleay, p. 48; Himalayan Monal (*Lophophorus impejanus*) from Himma-leh Mountains [Himalaya Mts.], Northern India, by Mrs. Macleay, p. 57; Great Argus (*Argusianus argus*) from Cochin China [Cochinchina, the southern third of Vietnam], by Mrs. Macleay, p. 57; and, Nicobar Pigeon (*Caloenas nicobarica*) from Nicobar Islands, by Alexander Macleay p. 57.

The record keeping in Bennett's era was poor and no register was kept at the Australian Museum until 1878; however, some of Macleay's birds listed in Bennett's catalogue appear to still be held in the Australian Museum (pers. comm., Walter E. Boles, Ornithology Collection Manager, Australian Museum, 2 April 2011).

BIRDS OF WILLIAM SHARP MACLEAY

William Sharp Macleay's primary interest lay in invertebrates (Figure 8). However, a life-long interest in natural history and evolution inevitably overlapped with birds. In England, his father's cabinet held birds and he had been exposed to them from an early age. In 1819, he included birds in his thesis the *Horae Entomologicae* and in Cuba continued to study birds and discuss their classification through a philosophical lens that persisted in including a deity in its focus.

In his classification, William Sharp placed birds between the chelonian reptiles (tortoises) and mammals. In order to shoehorn his grouping together or at least juxtapose them with slight connections he makes contradictory conclusions about morphological convergence shared by the different groups—he interpreted the “beak” of Hawksbill Turtle (*Eretmochelys imbricata*) as an affinity (homology) with bird-beaks, while dismissing as an analogy the “duck's bill” of *Ornithorhynchus paradoxus* [Platypus (*O. anatinus*)] (see Macleay 1819, p. 260-266). In these cases, he was simply overwhelmed in the paradoxical nature of convergence and chose morphological characters to fit his argument. His classification is artificial in the sense that he needed to find a created-order; in his case, an order created by a deity.

His Quinarian or the Circular System had its followers. William



Figure 8. William Sharp Macleay (1792-1865). Courtesy of the Macleay Museum, University of Sydney.

Swainson and Nicholas Vigors were among its most ardent supporters, who persisted in using Macleay's theory after others had moved away from it. Vigors applied a modified Quinarian System to birds in many publications from 1824-1830, particularly in his *Natural Affinities that connect the Orders and Families of Birds* (Vigors 1825, Bruce 2003). When William Sharp, commented on the classification adopted by

Vigors (1825), felt obliged to provide a caveat since Vigors had used his Quinarian System. William Sharp wrote diplomatically of Vigors, "I cannot help fearing, that in the course of the investigation he has been swayed in no small degree by warmth of friendship, perhaps, for this very reason, I am more incapacitated from coming to any correct decision on the merits of his paper" (Macleay 1827). Despite the caveat, William Sharp did conclude that Vigors was indeed correct. William Sharp was perhaps reluctant to let go of his theory especially with such strong support of his friends.

Cuba.—On arriving in Cuba, in December 1825, William Sharp wrote a lengthy account to his friend Nicholas Vigors of the ornithological observations made during the voyage, particularly from ports where he had stopped. "February 14, [1826] — Mr. Vigors read some extracts from a letter which he received from W. S. MacLeay, Esq. F.L.S., dated from the Havannah [sic Havana], December 27th, 1825. The extracts consisted of Ornithological observations made by that gentleman, during his voyage from England to the Island of Cuba, in the months of October, November, and December, 1825; including remarks on the Ornithology of the Islands of Madeira, Teneriffe, and St. Jago; as also a few cursory observations made at Barbadoes, Martinique, and off the coast of St. Domingo, on the same subject" (Vigors 1826, p. 553). Vigors, to the best of my knowledge, did not publish these bird lists.

While living in Cuba, William Sharp published a paper entitled *Remarks on the Comparative Anatomy of certain Birds of Cuba* (Macleay 1827). His intention was to gather data on the morphological and anatomical structure of tropical birds and then to apply these data to European birds to test if classificatory relationships held overall. He then drew examples at length from the literature transcribing passages in English, French, Latin, and Greek. He argued in support of Vigors' classification (an extension of his own), which gave five orders of birds: Raptores (birds of prey); Insessores (Passeriformes or perching birds and Psittaciformes); Rasores (Struthioniformes, Galliformes, Phasianidae and Columbiformes); Gallatores (wading birds); and, Natatores (swimming birds characterized by webbed feet, thus clumping ducks, swans, pelicans and terns etc.) (for further detail see Vigors 1825, p. 509). He also argued at length his analogous relationships between five groups in Aves and an equivalent five in

Mammalia (e.g., Cetacea = Natatores, because both are aquatic arms of each Class and Primates = Insessores, because both are omnivorous) (Macleay 1827, p. 32). What he failed to do was identify what the tropical birds had added or subtracted from the argument, having lost this in his rhetoric.

William Sharp Macleay collected birds in Cuba and sent them to England for accurate identification. He sent at least 45 species of birds from Cuba to Vigors (Fletcher 1920, p. 602). Vigors (1827, p. 432-448) described the birds and noted that some were undescribed species, although most were familiar species from the New World and common to workers in the United States. As with other donations to the Zoological Society's Museum, William Sharp's donations have been lost, as has the catalogue of this museum (Wheeler 1997). Thus, publications such as Vigors (1827) that recorded most of William Sharp's donations are the only record of the 4,000 birds once held in that museum.

BIRDS OF WILLIAM JOHN MACLEAY

William John Macleay (Figure 9) collected by all means available to him. His associations with the naturalists of his day were established by family and expanded by zeal. The means of his collecting are summarized below, in the most part limited to the years 1874-1880. The following information has been primarily gleaned from Fletcher's The Society's Heritage from the Macleays. Part II, published in 1929, from notes compiled by J. J. Fletcher and written by A. B. Walkom after Fletcher's untimely death (Fletcher 1929), and Macleay's personal journals, which were available for the years 1875, 1876, 1879, 1880, and 1881(1874 is missing, 1877 was likely never written, and 1878 consisted of only two entries), and published papers from the Proceedings of the Linnean Society of New South Wales, particularly the first ten volumes.

William Macleay purchased, exchanged and received donations of specimens from local and international sources. He collected birds through exploration and expedition—locally from his garden, to the surrounds of his adolescent city before suburbia set in, then extending to rural field-trips in the lower Murrumbidgee area and further abroad to Papua New Guinea with the *Chevert* Expedition. He dispatched his

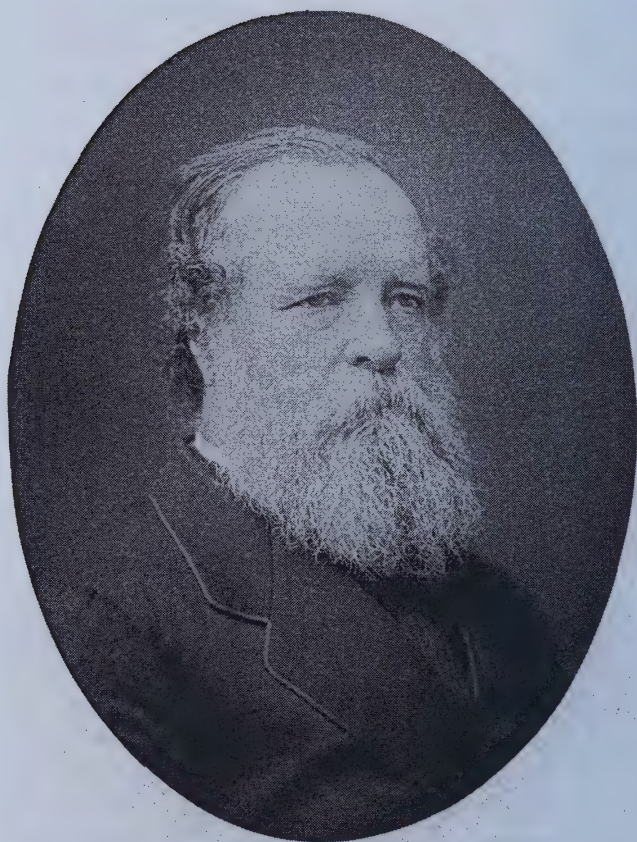


Figure 9. William John Macleay (1820-1891). Courtesy of the Macleay Museum, University of Sydney.

collectors to promising parts of Australia and the Pacific.

In the January 1874, Macleay moved to hire George Masters who was employed by the Australian Museum; writing in his journal, "I feel myself at liberty now to offer him £300 a year to assist me (when he is free) with my collection, with a promise of his having the curatorship of the Macleayan University Museum on my death, at the same salary" (Fletcher 1929, p. 221). Masters began work as Macleay's curator on 6 February 1874, a position he held until his death in 1912. He worked

assiduously alongside Macleay helping to amass the collections of the Macleay Museum and together published frequently on the Museum's more interesting acquisitions (Whitely 1971).

Expeditions and excursions.—On 30 December 1873, Macleay, Masters and William J. Stephens undertook the first field trip intended to collect vertebrates and begin the broadening of Macleay's collections (Fletcher 1929, p. 229). They travelled by train and then buggy to Goulburn and thence the lower Murrumbidgee River region where Macleay had spent many years as a prominent pastoralist. Though the weather was intolerably hot they managed at least to collect birds and invertebrates. Of the birds, Fletcher (1929, p. 229) stated that they were moulting, so that only half a dozen rare species were considered worth collecting. On this trip Masters introduced Macleay to a collector at Wagga Wagga by the name of West from whom Macleay purchased the first birds of his ornithological collection (see purchases section below). They returned again in October (15-19 October 1874), where Macleay wrote the following anecdote in his journal, "We became possessed of a Blue Heron [White-faced Heron (*Egretta novaehollandiae*)] in the most extraordinary way. It flew against the telegraph-wires, and broke its wing, just alongside the buggy" (Fletcher 1929, p. 229).

In June 1874, Macleay sent Edward Spalding to collect at the Endeavour River. Four shipments containing birds were sent back; July 31, about 20 birds; August 28, eight bird skins; 21 September, 17 bird skins, not in the collection—specifics mentioned were a hawk, Native Companion [Brolga (*Grus rubicunda*)], spoonbill and an oystercatcher [Royal Spoonbill (*Platalea regia*) and Australian Pied Oystercatcher (*Haematopus longirostris*) based on single specimens extant in the museum from Endeavour River]; and, December 7, Spalding returned with "a few birds" (Fletcher 1929, p. 230).

William Macleay's single largest and most important acquisition of birds came from the *Chevert* Expedition. Arriving back in Sydney before the *Chevert*, he reported that approximately 1,000 birds (plus nests and eggs) had been collected and he published broad details on the diversity and strengths of what had been collected and the places visited (Macleay 1875a).

In January 1875, before the *Chevert* Expedition, Macleay sent Spalding to Townsville and surrounds, although Spalding returned prematurely in April with fever. Nevertheless, he collected 45 species

of birds. Macleay wrote in his journal that only three of these were new to his museum "White Ibis, *Glyciphila fasciata* and *Erythra quadristigata*" [which are: Australian White Ibis (*Threskiornis molucca*), although there is no specimen of this species in the Macleay Museum from where Spalding collected; Bar-breasted Honeyeater (*Ramsayornis fasciatus*); and White-browed Crake (*Amaurornis cinerea*)] (Macleay 18 March 1875-3 April 1875). However, there was one species in Spalding's batch that had been tentatively placed as another species by Ramsay and thus overlooked by Macleay as a new species. Ramsay later noted and described this new species of honeyeater, Macleay's Honeyeater (*Ptilotus macleayana* = *Xanthotis macleayanus*). Ramsay (1875a) wrote, "I have since, however, through the kindness of Mr. Macleay, been enabled to examine several fine specimens obtained by his collector, Edward Spalding, near Cooktown, and have no doubt whatever of its being a fully adult bird of a distinct species." On Monday 25 January 1875 Macleay wrote in his journal: "Brazier described some shells, Ramsay a bird *Ptilotis Macleayana*."

Ramsay (1868) had originally described a single bird (collected in 1867 by Spalding for Ramsay) as "*Ptilotus versicolor*?" He had thought that it may have been the young of that species and gave it only a cursory description and remained troubled by his placement of it, hence the question mark after the species name.

February 1876, after the *Chevert* Expedition, Macleay wrote in his journal, "The new Museum is progressing slowly . . . Mr Beaumont [the builder] has promised to have the upstairs room ready in a week. I wish Spalding to work in it during my absence" (Macleay 29 February 1876). Macleay remarked that Spalding had completed 60 stuffed and mounted birds by mid-February and that he did them with "taste and neatness" (Macleay 19 February 1876). Macleay wanted somewhere for Spalding to continue his work while he was absent. Excited from his success on the *Chevert* Expedition, Macleay was already planning his next excursion, another collecting trip to the lower Murrumbidgee River region with George Masters.

Macleay and Masters were away for five weeks on their Murrumbidgee trip, travelling by the new train to Gunning and then by buggy and staying at Kerarbury, Wagga Wagga, and at road inns. Macleay divided his time between his pastoral businesses and the business of collecting. He made a short visit to his vineyard at Lake Albert and his now jointly owned sheep station Kerarbury, on the lower

Murrumbidgee, spending the remainder of his time on collecting. He and Masters made several calls on West from whom they bought birds that West had prepared and skinned others they had shot (see the section on West below). They returned to Sydney on 17 April, with over 100 birds claiming, “many good and six new to the collection” (Macleay 11 March 1876 – 17 April 1876).

Macleay did not keep a journal during 1877, thus information on the museum’s activities must be gleaned from other sources. During 1877, Spalding was sent to Port Darwin for five months (May–September) and collected “various things” including birds (Macleay 1878; Masters 1878; Fletcher 1929, p. 263). Masters (1878) described the birds, listing 106 species. One thought to be a new species of butcherbird (*Cracticus spaldingi*) and named by Masters after Spalding: it is now considered a subspecies of Black Butcherbird (*Cracticus quoyi spaldingi*). Masters remarked in his publication that at the time many of the other species were poorly known and inadequately represented in collections (Masters 1878).

Sydney and surrounds: Local collecting.—Early in 1874, Masters and Macleay would go down to the shore at Elizabeth Bay and collect, venturing; to different localities around Port Jackson (Sydney Harbor) as the year progressed. They undertook excursions to Bondi and Long Bay ocean-beaches (April 28 and 30, respectively) following from a large storm “to see what the sea had thrown up” (Fletcher 1929, p. 223). A beach-washed Short-tailed Shearwater (*Ardenna tenuirostris*) from Bondi remains in the collection from these trips. Macleay hired a small steamer for a month of dredging, from which a shooting party was sometimes sent ashore after birds. On 17 June 1874, while dredging in the harbour Masters shot three Crested Terns (*Thalasseus bergii*) and two Australasian Gannets (*Morus serrator*) (Fletcher 1929, p. 224), specimens of which are extant in the museum. Macleay also hired a more sea-going vessel, the *Peahen*, which he used for excursions south to Jarvis Bay and north to Port Stephens.

Macleay and Masters would take a Hansom for local collecting trips. A Hansom Cab may seem a little too grand or genteel for field trips to shoot birds, but it was, in Macleay’s time, a common convenience in Sydney and one to which he and Masters were accustomed. Day excursions were undertaken during 1874 to La Perouse, Randwick, Maroubra, Bondi, and Botany Bay using a hired

Hansom. The birds reported from these trips were: Maroubra—September 9, Variegated Fairy-wren (*Malurus lamberti*), and a common honeyeater; La Perouse—September 13, Masters, showed a great deal of patience and got two Eastern Bristlebirds (*Dasyornis brachypterus*) and two Southern Emu-wrens (*Stipiturus malachurus*), they found the nest of Tawny-crowned Honeyeater (*Gliciphila melanops*) with an egg in it, which they took; Bondi—September 18, Masters shot some emu-wrens and Macleay found a nest of Tawny-crowned Honeyeater with two eggs in it (Fletcher 1929, p. 228). Only one other excursion by Masters was reported. He shot emu-wrens and bristlebirds on a day-trip to Long Bay (Macleay 11 October 1876; Fletcher 1929, p. 260). Another source quotes Masters as having shot a male and female Orange-bellied Parrot (*Neophema chrysogaster*) at Long Bay (North 1912).

The old garden at Elizabeth Bay was to be sub-divided with the greater portion of it offered for sale in 1875. Though the “old garden” had supplied specimens to all the Macleays over the years, William Macleay now took a keen interest in sampling its fauna before it was lost. “A few birds of interest were sacrificed, including one of a community of Nankeen Night-Heron (*Nycticorax caledonicus*) which for many years camped during the day, and nested in some of the old pine-trees [*Apinus pinea*] near the house” (Fletcher 1929, p. 228-229).

On 17 July 1874 “Masters shot a pigeon, which turns out to be an Indian species” [Spotted Dove (*Streptopelia chinensis*)]; it was found to be a healthy female with fine plumage and with eggs in its oviduct. Macleay considered it might be an aviary escapee; though a week later, on July 24, Masters shot another in the old garden (Fletcher 1929, p. 229). These sightings predate by 24 years the earliest record for Sydney, given by Blakers et al. (1984) as 1898. The current assumption is that this species was first introduced to Australia in Melbourne, probably in the 1860s (Blakers et al. 1984).

The shoreline at Elizabeth Bay had been a favourite haunt of William Sharp Macleay and had over the years given up many specimens. These had been variously obtained from dropping fishing lines over the side of the *Chevert* while moored at the wharf to collecting beach-washed birds along the shore. An entry in William John Macleay’s journal for 1880 gives a good example of what might appear there, “A species of *Nestris* [*sic* *Nectris* = Fluttering Shearwater (*Puffinus gavia*)] was picked up today, dead on the beach by Hourigan

[the gardener], it is new to the Australian Fauna, though well known at New Zealand" (Macleay 15 January 1880). This specimen is likely extant in the museum as Alfred North noted it in a drawer of the collections: "I found a specimen in one of the drawers labelled *Puffinus gavia*, Elizabeth Bay, Port Jackson, 15 January 1880" (North 1913–1914, p. 372).

Purchases.—When William Macleay first began collecting birds from West in Wagga Wagga, he purchased 45 specimens of 29 species of birds for £3.13.6 ([Macleay] Exchanges Book 8 January 1874). Fulton (2001) erroneously stated August, 1874. Immediately following the first entry in the Exchanges Book there is another lot of 19 specimens of 14 species of birds for £3, which was purchased from George Masters (Exchanges Book 24 February 1874). In Fletcher (1929, p. 234) there is quotation, presumably from Macleay's 1874 journal, dated January 26, written after the bird skins were put away in a drawer, "This is the commencement of my ornithological collection." A browse through the list of species obtained from West highlights the colour and diversity that would have undoubtedly captured Macleay's eye; the colour and quality would have been particularly alluring for a man desiring to amass a more diverse museum.

Macleay purchased another three times from West, once while Macleay and Masters were again collecting in the Wagga Wagga area. West sent, through Masters, nine skins of birds, "four species of hawks one which I had not got and a pair of snipe" (Macleay 4 January 1875). The only snipe extant in the museum from Wagga Wagga is Latham's Snipe (*Gallinago hardwickii*). Later the same month Masters received another letter from West, which enclosed a small bird, another species new to Macleay's collection, the Black Honeyeater (*Sugomel niger*) (Macleay 21 January 1875). Fletcher (1929, p. 241) erroneously reported the second of these as January 24. Lastly, during March 1876, when Macleay and Masters were collecting for themselves in the Lower Murrumbidgee area, near Wagga Wagga, Macleay wrote in his journal, "Masters lost no time in looking up West, he has got I believe a few good birds [unspecified], which of course I shall purchase" (Macleay 16 March 1876). On the same field trip Macleay and Masters skinned some of their own birds at West's home; Macleay also wrote that they went to a big lagoon beyond the racecourse where Masters shot two crows and a Whistling Kite (*Haliastur sphenurus*). All of these were

subsequently skinned at West's place (Macleay 18 March 1876). A single Australian Raven (*Corvus coronoides*) is the only corvid from Wagga Wagga still in the museum.

In the first few months of 1874 it was evident that Macleay was keen to expand his collection with non-Australian vertebrates and he commenced with birds as he had done for the Australian vertebrates. In his journal for April 12, that year Macleay recounted, "Wrote letters all this morning. I wrote to Mr. Aldolphe Boucard [a French ornithologist and dealer in natural history specimens, based in London] giving him an order for 1,000 species of (foreign) birds. I wrote to my brother Alick (in England) about the same matter" (Fletcher 1929, p. 234). Boucard published a classification of the birds of the world and highlighted (with asterisks) species for which he had duplicates for sale. He stated that he had done this deliberately to facilitate their sale (Boucard 1876). William John Macleay probably placed his initial orders from an earlier version of this publication.

Of the 1,000 species ordered, 850 skins arrived on 28 October 1874, named and labelled. Almost all were small South and Central American birds, although about 30 were Australian (nine species not previously held by Macleay), and a few were European. Seventy-eight were species of hummingbirds; the gender of 50 species was given (Fletcher 1929, p. 234). More information on this delivery is given on 6 November 1874, when Macleay noted that the sorting and marking-off from Gray's Handbook (Gray 1869–1871) was completed that day. The number of species counted by Macleay was "under 650" (Fletcher 1929, p. 234). Macleay posted a second order on 27 November 1874, "I wrote to-day to Boucard, London, about the birds and ordering more; that is desiring him to complete the last order of 1,000 species and ordering another 1,000 species" (Fletcher 1929, p. 234). Boucard sent 800 more birds, which arrived at a time when Macleay's journal was not kept or while he was away on the *Chevert* (Macleay 26 January 1876; Fletcher 1929, p. 241). Macleay paid £180 to Boucard for this last instalment. The final mention of Boucard was in June 1876 and the comment in Macleay's journal suggests that business was then terminated, "I had a letter from Boucard in answer to one I wrote him about his arrangements with me, it is not satisfactory" (Macleay 8 June 1876).

A consignment from Gruber of San Francisco arrived prior to the *Chevert's* departure (received 12 February 1875). It contained 100

species of birds, some of which were too large to fit into drawers, so were instead packed into a case in the small room of the library (Fletcher 1929, p. 240-241). Another consignment was to arrive in October that year after Macleay returned from the *Chevert* Expedition.

At different times in 1874 and 1875 Macleay bought a variety of faunal items from John Brazier. On 20 April 1874, Brazier supplied 19 birds (Fletcher 1929, p. 234). There are no other data on these birds. Brazier had been on collecting trips into the western Pacific before this and they may have originated from there.

William Webb, convict collector/naturalist, supplied Macleay with faunal specimens from King George Sound, south-western Australia. However, the precise geographical localities of Webb's specimens are unknown. His birds are labelled "King George Sound," which was their shipping point and their original labels have been removed. The provenance of King George Sound is unreliable, because Webb collected botanical specimens widely through the south-west with George Maxwell for Baron Ferdinand von Müeller (Abbott 1999, Little et al. 2009). He is also credited with collecting more specimens of Noisy Scrub-bird (*Atrichornis clamosus*) than anyone else (Whittell 1954). Two of Webb's Noisy Scrub-birds, among other birds, are extant in the Macleay Museum.

Webb sent six lots of birds to Macleay from early 1875 through 1879. In the first lot Macleay reported 90 birds, some large, such as the Emu (*Dromaius novaehollandiae*). He was impressed by the specimens and wrote that he considered them "a very good lot" (Macleay 16 February 1875). Of the next shipment Macleay wrote, "The box from King G. Sound so long amissing came on Saturday and was opened this morning. It contained . . . a dozen birds, two of them new to my collection (Macleay 10 May 1875). The next instalment arrived in 1876, well after the *Chevert* had returned. "Webb's next box from King Georges Sound contained 78 birds some very good, 72 of the birds new to my collection" (Macleay 22 August 1876). One of the entries in Macleay's diary for 1878 reads, "Sent cheque for £30 to Moir K. G. Sound for Webb for specimens" (Macleay 10 May 1878). This last payment highlights that more specimens had been received in 1877 or early 1878.

Masters was often an intermediary in transactions with Webb. He had collected at King George Sound for Gerard Krefft of the Australian Museum in 1866 and 1868-1869 (Abbott 1999). This overlapped the

period that Webb was known to be a convict in the same area; it seems likely that the two met there and became friends. Such a friendship may explain why Webb sent specimens to Masters instead of Macleay. Macleay wrote in his journal, "Masters got his box long overdue from Webb of King George's Sound. It contains a number of birds (and 1 mammal), one bird only a black cockatoo (*Naso*) [Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) Gould 1837] new to my collection, there [*sic* they] were however a good lot and I am giving Masters a cheque for £6 to pay for them" (Macleay 18 February 1879). The last entry concerning Webb falls in 1879, "Since my illness the Museum has received a few birds \&c one new to the collection (a black petrel) [Great-winged Petrel (*Pterodroma macroptera*)] from Webb, K. G. Sound, some lists of birds" (Macleay 28 August 1879). "The lists" may indicate that Macleay kept buying birds from Webb, since on many occasions he had remarked on the quality of the specimens.

Post Chevert Purchases.—Specimens previously ordered from Boucard and Gruber had arrived at Elizabeth Bay while the *Chevert* was absent during 1875; among them were 800 bird skins from Boucard in London. The second of two large boxes of bird skins from Ferdinand Gruber, of San Francisco, arrived following the *Chevert's* return (received 10 October 1875); it included some valuable skins from the Arctic region of the Pacific and some from Arizona, mixed with other "common enough things" (Macleay 12 October 1875; Fletcher 1929, p. 241). In total, Macleay spent £63 on the birds from Gruber (Tilbrook 1992). Ferdinand Gruber had been curator of the museum at Woodward's Gardens in San Francisco, a combined amusement park, botanical and zoological museum (Finsch 1880).

More birds had arrived at the Macleay Museum in 1875 from Fiji (Fletcher 1929, p. 240-241). These were sent by Charles Pearce who at different times worked for E. L. Layard in Fiji (Fisher and Longmore 1995). These were later described by Ramsay (1875c,d, 1876a). He considered some to represent new genera and others new species or varieties. A reinvestigation of the Pearce and Layard birds, by Clemency Fisher showed that many were type specimens and many were extant in the Macleay Museum (Fisher and Longmore 1995).

Fifty birds were acquired from James Cockerell (and son) from New Britain, New Island, and Duke of York Island (Fletcher 1929, p.

261). These specimens, labelled from the Bismarck Archipelago, likely extant in the museum with 27 species represented in 45 skins, including two Dwarf Cassowaries (*Casuarius bennetti*).

William F. Petterd sent birds, eggs and nests, mammals, fish, shells echinoderms, and crustaceans from Tasmania to William Macleay. Petterd was either known to Macleay or had worked with him before 1875, because he was hired into the *Chevert's* scientific crew at £80/month when Macleay was turning away many others (Macleay 20 March 1875). Petterd stayed at Somerset, Cape York, when the *Chevert* sailed for Sydney. He returned to New Guinea as the opportunity arose (Anonymous 1875c). Petterd later returned to Tasmania from where he sent specimens including a box of bird skins, which contained ten species new to Macleay's collection (Macleay 18 July 1876). He remained active, sending another box of birds from "Hobart-Town" (Macleay 1 September 1876) and again he sent "about 30 birds" with "some bird nests and eggs" and many specimens of other phyla (Macleay 27 October 1876).

Kendal Broadbent entered the Macleay narrative during the voyage of the *Chevert*; when he was reported to have departed Somerset days or weeks before the arrival of Macleay's expedition (Macleay 19 June 1875). He had been collecting on the western side of Cape York around the Gulf of Carpentaria and at some later stage (date unknown) had sold his birds to Macleay. In December 1875, Masters published the ornithology of the *Chevert* part one, which included birds collected by Broadbent at Kimberley (=Karumba), Norman River, Gulf of Carpentaria (Masters 1875, Mathews 1915). These included the supposedly new species *Podargus gouldi* [= Tawny Frogmouth (*P. strigoides phalaenoides*)] and *Gerygone simplex* [= Mangrove Gerygone (*Gerygone l. levigaster*)]. In 1876, the day after Broadbent and Petterd had called on Macleay to sell their New Guinea mammals, Broadbent sold a small quantity of Australian birds to Macleay for £3.8/-, of which no other particulars were given (Macleay 8 March 1876).

Macleay is known to have bought prepared skins from taxidermists: Mr. Palmer of Hunter Street, Sydney and Mr. Waller of Brisbane. He and/or Masters would attend Palmer's shop to look over and buy specimens. Fletcher (1929, p. 235) suggests that Macleay's association with Palmer began on 23 June 1874 when he purchased 130

skins, including 36 from Cape York. Following this purchase Macleay apparently came to an arrangement with Palmer to purchase birds not then in Macleay's collection and at a fixed rate (Fletcher 1929, p. 235). However, Macleay's journal entries in the years 1875-1876 indicate that prices were far from fixed and he would not pay Palmer's asking price. Frequently either he or Masters or both would return later to buy specimens for less than the original quote. Macleay wrote in his journal, "I had an offer today from Palmer of some birds and mammals, and some of them I may probably buy tomorrow, but as usual he asks an absurd price" (Macleay 12 February 1875). During 1875 and 1876 Macleay (taken from his journals) bought 124 birds (including 30 from California, USA) and two cases of Samoan birds from Palmer, for £38.14/-. Fletcher (1929, p. 235) claims a similar figure for 1874 of "130 bird skins, including 36 from Cape York." Another 94 are given in the same publication, by Fletcher, for 15 January 1875, that I have not found in Macleay's journals. The most interesting birds obtained from Palmer include two scrub-birds (*Atrichornis* spp.), probably Rufous Scrub-birds (*A. rufescens*), given from where most of Palmer's birds were derived, and a Tooth-billed Pigeon (*Didunculus strigirostris*) among the Samoan birds that originated Revd George Brown. Brown later sold his large and valuable collection of birds from New Ireland (257 specimens of 90 species) to Ramsay at the Australian Museum, although he had been taught to prepare them by Macleay. Macleay had bought Brown's first and poorly prepared specimens through Palmer (Macleay 5-8 March 1875; Ramsay 1877b). Macleay also bought specimens from the taxidermist/collector Eli Waller, in Brisbane. Macleay recorded purchasing 90 birds from Waller in 1874, 1875 and 1876 (Fletcher 1929). His journals indicate that he spent £1 on a single skin of Little Grassbird (*Megalurus gramineus*) and another £2 for an Australian bird and 11 Indonesian birds (Macleay 3 February and 8 March 1876).

Ramsay (1876b) discussed a rush of game birds sold in Sydney in the mid-1870s and provided information on another source for birds used by Macleay. Most of the game birds came from Melbourne and originated from lakes and lagoons in the vicinity of Ballarat. Game more local to Sydney was obtained in the Illawarra region, south of Sydney, and the Hunter River region to the north (Ramsay 1876b). Macleay advised Ramsay that he had bought a Banded Stilt (*Cladorhynchus leucocephalus*) at the markets. A pair of Blue-billed

Ducks (*Oxyura australis*) was obtained by Spalding from a Sydney poulterer, having come from Melbourne with other game birds (Macleay 28 July 1876; Ramsay 1876b). Other game birds noted in Macleay's journals were Banded Stilt, Native Companions [Brolga], "pink-eyed Ducks" [*sic* Pink-eared Duck (*Malacorhynchus membranaceus*)], Eurasian Coot (*Fulica atra*) and "teal duck" (Macleay 14-28 July 1876; Fletcher 1929, p. 261). Ramsay (1876b) also gives Chestnut Teal *Anas punctata* [= *A. castanea*] as a teal that was commonly available as game.

Macleay purchased birds from Andrew Goldie (and associates), from their expedition to the Astrolabe Range, New Guinea (Ramsay 1883; Fletcher 1929, p. 271). Ramsay (1883) refers to "a collection lately added to the extensive collection at Elizabeth Bay" obtained from "Messrs. Rolles and Carl von Hunstein, and other members of Mr. Goldie's party" and a collection of 1,000 skins that he had acquired from the same sources. Using both sets of specimens, Ramsay produced a list of species not before recorded in New Guinea. Some were new species, with one named *Paradisaea susannae* "in honour of the amiable wife of the Honourable W. Macleay" (Ramsay 1883).

Syntypes of *Paradisaea susannae* [Goldie's Bird-of-paradise (*Paradisaea decora*)] are extant in the Macleay collection. Longmore (1991) stated that more than one specimen was available to Ramsay for his type description. Although Ramsay did not designate types, his description refers to "others" in a way that indicates at least three specimens were used. There were four specimens in the Australian Museum, one which was exchanged with the Queensland Museum and could not be found (Longmore 1991). Ramsay (1883) stated that the Australian and Macleay Museum's collections were used in the descriptions that included *Paradisaea susannae*. The three extant Macleay specimens—B2303, B2304 and B2305 are likely syntypes.

Exchanges.—Macleay had previously exchanged invertebrates with many naturalists, and now he wanted to exchange more widely using vertebrate taxa. Thus, on 9 February 1874, he had Masters write on his behalf to various colleagues asking if they were willing to resume exchanges (Fletcher 1929, p. 230). Frederick George Waterhouse, of the South Australian Institute (later the South Australian Museum), had exchanged insects with Macleay since 1862 and was prepared to exchange vertebrates. Fletcher (1929, p. 231-232) reported

those exchanges taking them from Macleay's missing 1874 journal: June 9, "Mr. Waterhouse, of the S.A. Institute, sent me, through Masters . . . a box containing 32 species of South Australian birds, of which 23 were not previously in my collection". On July 11, Waterhouse's second consignment was received with 36 species of birds from South Australia, Western Australia, and the Northern Territory. Waterhouse's birds are of special historical interest because they were possibly collected in 1861-1863 when he joined John McDougall Stuart on the first successful north-south crossing of the Australian continent (Stuart 1865). Waterhouse returned from this expedition with a fine collection of bird skins, including the first Princess Parrot (*Polytelis alexandrae*) (Gould 1863; Kraehenbuehl 2011). Waterhouse's birds in the Macleay Museum are of particular interest, because Waterhouse sent many of his Australian birds overseas. In exchange, Macleay sent rare birds [unspecified] plus other things on 11 August 1874. Toward the end of the year Macleay sent more birds, a pair each of Macleay's Honeyeater and White-streaked Honeyeater (*Trichodere cockerelli*) plus other things on 23 December 1874 (Fletcher 1929, p. 232). The fact the Macleay sent valuable bird specimens in return suggests he was impressed with the birds sent to him by Waterhouse.

Macleay's New Zealand connections were James Hector of the Colonial Museum, Wellington, and Julius von Haast of the Canterbury Museum, Christchurch. Von Haast sent a consignment of 34 species of New Zealand birds and moa bones that were received on 9 March 1876. In 1879, Macleay received "birds" [unspecified] from Hector (Macleay 4 September 1879). These turned out to be extremely rare Huia's in very poor condition "riddled" with carnivorous beetle larvae (discussed above).

George Bidie was the Superintendent of the Central Museum in Madras (1872-1884); he sent a consignment of small mammals and about 200 species of birds in good condition, which was received on 28 May 1879 (Fletcher 1929, p. 266). Macleay responded warmly and the balance came to favour Bidie. In 1881, Macleay became concerned with the exchanges, writing in his journal, "I have not heard from Dr Bidie for more than a year and he owes me much for exchange" (Macleay 29 January 1881). Not long after this Macleay received a bill of lading for a cask of fish allaying his fears. Macleay resumed the exchanges sending a case containing birds [unspecified] and other taxa (Macleay 22 February 1881).

Donations.—Important additions to William Macleay's collections were donations, which accrued over time from his friends, colleagues, and correspondents from around Australia and the world. John Brazier and James Cox donated avian material knowing Macleay would want it, including a Sooty Albatross (*Phoebastria fusca*) from near the equator, an egg of *Megapodius brazieyi* from Banks Island [Vanuatu Scrubfowl (*Megapodius layardi*)], sixteen eggs from a Tern on Treasury Island and two eggs of the White Pigeon of the north [probably Pied Imperial-Pigeon], and an Emu egg (Fletcher 1929, p. 232). Masters donated a Whistling Kite, a curlew, and a honeyeater, from the south side of Botany Bay; a goshawk with unknown location; a Painted Button-quail (*Turnix varius*) shot near Waverley, and other eggs and nests (discussed in their sections above) (Fletcher 1929, p. 233). From Captain Arthur Onslow (Alexander Macleay's grandson) was received a Purple Swamphen (*Porphyrio porphyrio*) and a live Tawny Frogmouth (*P. strigoides*) from Camden (Fletcher 1929, p. 233). Archibald Boyd donated a number of birds and birds' eggs from Fiji (Fletcher 1929, p. 260). Mr. Anderson, New England [?] sent two Red-necked Avocets (*Recurvirostra novaehollandiae*) that are extant in the museum. Other donations appear in the literature related to the lore of the Macleays. For example, "Dr. Cox, numerous visits, bringing donations . . ." once while discussing the hypothetical trip to New Guinea (Fletcher 1929, p. 258). In that instance, Cox had brought an unspecified bird-of-paradise from New Guinea during a whisky party (Macmillan 1957, p. 36). This single donation may have triggered the *Chevert Expedition*.

CONCLUSION

The Macleay Building still stands in the grounds of The University of Sydney. The Macleay Museum now resides within the make-shift attic built for storage. Nevertheless, the sense of time lingers in the Museum. Time wafts poignantly from the antique cedar cabinets, in which much of the massive collection still resides in jars, boxes, cabinets and draws. Slide open a plush wooden draw and the sense, if not the smell of time exudes as the eyes feast on an array of rare and somewhat forgotten bird-skins. The pathos is tactile juxtaposed with

the depth of history. I have spent many late evenings in the Museum, after the university staff have long gone home, measuring skins or bones only to stop in the quiet and feel myself gently awash in the stream of time. In the attic it is still possible to relive the earlier times of the munificent gift, the fanfare of the *Chevert*, and the whole grand-old-building. The three generations of the narrative above flows through you; close your eyes and any of the moments in time can be recalled, especially if you are holding onto a specimen and you know where in the Macleay narrative it came from.

A future for the Macleay Museum lies in those people prepared to put the collection to use. A museum lives only in the present and makes plans only for the future—within its draws are the discoveries of the future. The Macleay Museum is surrounded by many students and researchers and it is open to the public: it is these people along with a dedicated staff that can undo the pathos that now resides within and continue a history of science and conservation well into the future.

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A History of Environmental Ornithology at the Australian Museum

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ABSTRACT.— Museums have always conducted ecological and behavioural studies of birds. The Australian Museum has a long history of such research, but since 1968 has employed ecologists with special interests in avian ecology and behaviour. This eventuated by chance with the establishment of a Department of Environmental Studies at the museum intended to assist the newly created New South Wales National Parks and Wildlife Service in identifying key areas for nature conservation. The establishment of a purely environmental or ecological unit at a museum was pioneering and the vision of Frank Talbot, then the museum's Director. Harry F. Recher, an American who had arrived in Australia in 1967, was appointed to head the department. Recher had research interests in birds and used birds as the primary faunal group to identify biologically important areas for conservation.

For more than 40 years after the establishment of the environmental unit, subsequently renamed the Department of "Vertebrate Ecology" and then as "Terrestrial Ecology," the Australian Museum had a dynamic and wide-ranging ecological program of avian research centred mainly in New South Wales, but extending to northern and western Australia as well. All research was initially applied to conservation and land management issues including reserve selection and natural area management. In the beginning, birds were selected as the best group of animals to develop biological survey techniques and understand how forestry, habitat fragmentation, and fire affected the fauna of Australian heaths and forests. The aim was to provide ecologically based conservation and management advice. This work has also been central to understanding how fuel reduction fires affect nomadic species. After Graham H. Pyke was appointed as a research scientist in 1980, birds were also the focus of his studies directed at the foraging behaviour and population biology of honeyeaters, and relationships between these birds and the plants they pollinate. Recher left the museum in 1988 and, with the appointment of Richard Major in 1990 as his successor, the department's studies emphasized birds in human modified environments including the sheep/wheat region of NSW and urban Sydney. This work has investigated threatening processes, including

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habitat fragmentation, urbanisation, and human-elevated predation rates as well as detailed natural history studies of both threatened species and species that have become superabundant as a result of human activities. Major developed close relationships with Birds Australia (BA), Australia's largest ornithological society, and collaborated in developing the Birds in Backyards program with BA. These studies and programs are important in their high level of community involvement and in facilitating the protection of birds in off-reserve situations.

Since the late 1990s, a policy of emphasising collection based research has dominated research at the Australian Museum, purely ecological and environmental studies of birds have diminished, and attempts to establish ecological schemes not requiring specimen collecting have foundered. In allowing all of this to happen, the museum failed to accept the close relationship that exists between collections and studies of living organisms in the field and failed to recognise how schemes that do not require the collection of specimens could complement its specimen-based collection. Terrestrial Ecology, was reduced to a single ecologist (Richard Major) in 2007 with the retirement of Graham Pyke, and restructured out of existence on Friday, 2 December 2011 when it was merged with the collection-oriented Terrestrial Vertebrates Group.

Frank Talbot, Museum Director, created the Department of Environmental Studies at the Australian Museum in 1968. This was a pioneering change for Australian museums. Although museum biologists had long studied and written about the ecology and behaviour of the organisms they worked with, taxonomy, systematics, biogeography, and evolution were the primary areas for museum research. A unit whose prime research responsibilities were ecological and environmental was a significant shift in museum ideology. It meant that the Australian Museum could develop a team that would contribute directly to the increasing public interest and concern for the environment. It also meant that curators whose primary research interests were systematics and evolution, not ecology or the environment, could be relieved in whole or part of the need to respond to inquiries regarding the environment. With the advent of the need for government departments and industry to justify resource and infrastructure development on environmental grounds and community demands for effective, long-term nature conservation, ecological and environmental inquiries were increasing rapidly and the museum was seen as an important source of basic ecological and environmental information. The initial objective of the Department of Environmental Studies was to assist the newly created New South Wales (NSW) National Parks and Wildlife Service (NPWS) through the Scientific Committee advising the Minister of Lands, Tom Lewis, by providing

advice on areas of Crown Land suitable for reservation as National Parks and Nature Reserves. The first surveys were along the north coast of NSW and built on reports prepared by H. J. (John) de S. Disney, Curator of Birds, in collaboration with other museum staff. Birds, as well as vegetation and other vertebrates, were prominent in these early surveys being relatively well-known and easy to locate and identify.

A dedicated "environmental studies unit" persisted at the museum until the 1990s when environmental services was developed into a commercial arm that bid for and conducted environmental studies using museum staff and expertise as appropriate. With commercialisation, it could be said that environmental and ecological studies at the Australian Museum ceased to exist in their own right and persisted only as the research of individuals. Following its inception in 1968, Environmental Studies (or "Terrestrial Ecology" as it eventually came to be known) had four research scientists; Harry F. Recher (1968-1988), Stephen S. Clark (1970-1975), Graham H. Pyke (1980-present), Richard E. Major (1990-present). Clark was a botanist, whereas Recher, Pyke, and Major had special interests in avian ecology and behaviour.

RESEARCH SCIENTISTS

Harry F. Recher (1938–).— Recher arrived from the United States (USA) in 1967 as a Lecturer in Zoology at the University of Sydney. In 1968, he was appointed to head the Department of Environmental Studies at the Australian Museum. Recher did his Ph.D. at Stanford University on migratory waders with Paul R. Ehrlich followed by a post-doctoral studying forest birds in Puerto Rico and herons along the east coast of the United States with Robert H. MacArthur at the University of Pennsylvania and Princeton University. He was appointed to the University of Sydney on the recommendation of Ehrlich and a brief phone conversation with Charles Birch, Professor of Zoology at Sydney. Recher was eventually joined by Stephen S. Clark, also from the USA. Recher and Clark had the assistance of a series of Technical Officers and research assistants among the most prominent of whom were Greg Gowing, Dan Lunney, David Milledge, and Heimo Posamentier. Gowing, Lunney, and Posamentier became highly skilled and experienced field biologists, while Milledge, who first joined the museum as a member of the Shelf Benthic Survey (a

project investigating possible impacts of deep water sewage outfalls off Sydney) in 1972, was already a highly experienced field biologist and skilled ornithologist from Tasmania. Milledge included studies of oceanic birds in his duties with the Shelf Benthic Survey.

After leaving the museum in the early 80s, Milledge worked as an independent environmental consultant and ecologist based on the NSW north coast. Posamentier eventually returned to Germany working as a small mammal ecologist in Bangladesh, Southeast Asia, and Africa for German aid agencies, but Gowing remained at the Museum for his working life continuing to assist with research, data analysis, and collection management. Dan Lunney, who was an education officer at NPWS, joined Recher after the 1972 Nadgee Nature Reserve wildfire as a Research Assistant employed on grants from the Ian Potter Foundation and the Australian Research Committee (ARC) to study the effects of the fire on small mammals (*Antechinus*, *Rattus*). After 1975, Lunney returned to NPWS and assumed responsibility for the long-term studies of small mammals at Nadgee that Recher had initiated in 1969, as well as undertaking major research programs on south coast forests, bats, and Koala (*Phascolarctos cinereus*). Posamentier and Lunney earned MSc's from the University of Sydney for studies on small mammals; Posamentier on heathland mammal communities and Lunney on the Swamp Rat (*Rattus lutreolus*). Lunney was eventually awarded Honorary DSc's from the University of Sydney and Murdoch University for his outstanding contributions as a research scientist and editor.

Recher advised the Scientific Committee, later becoming a member, through the early 1970s when the Committee was eventually wound up and the NPWS sufficiently established to run its own survey and research programs. As the needs of NPWS for external assistance diminished, Environmental Studies at the Australian Museum assumed other responsibilities increasingly becoming a full-fledged field research unit, as well as being responsible for providing ecological and environmental advice to other government departments, non-government organizations, industry, and the public. Recher continued his involvement with NPWS as the museum's representative on the service's statutory Advisory Council until 1987.

Environmental Studies at the Australian Museum was quickly embroiled in political and public controversy involving conflicts between land use and nature conservation. The Scientific Committee

became involved with the need to reserve important natural areas from mining for heavy metals and minerals (e.g., titanium, zircon) found in the sands of coastal dunes, a highly contentious conservation issue. One such area was at Myall Lakes just north Newcastle where the museum sought to add faunal data through bird surveys (Recher 1975) to an already extensive data base on vegetation and geomorphology that highlighted the region's conservation and biodiversity values. The evidence strongly suggested that the dunes at Myall Lakes could not be mined without permanent loss of key ecological attributes and Recher, through the Scientific Committee, proposed the conservation of the entire catchment of the Myall Lakes, with the area immediately around the lakes reserved as National Park (see Recher 1971a,b). This concept of conservation that embraced forestry, agriculture, and nature conservation in a single reserve was rejected by key individuals in the conservation movement, as well as by key staff in NPWS. In the end the Myall Lakes' sand dunes were mined and an opportunity lost, with the catchment unprotected and the national park that was created was too small and disturbed to withstand the pressures of a growing human population on its boundaries. The conflict over Myall Lakes was just the first that would involve environmental studies at the museum. There were times when government Ministers rebuked the Museum Director for the actions of his environmental staff and times when the same staff were called upon to resolve conflict within the government itself, as when Recher was asked to chair an inquiry into land use and conservation conflicts in NSW over which senior Ministers in the government disagreed (Recher 1977a, 1978).

In 1971, in response to another conflict between conservation and development, the museum was approached by the Lord Howe Island Board to carry out an environmental study of Lord Howe Island (see Recher and Clark 1975). With the assistance of Stephen Clark, the survey was co-ordinated by Harry Recher and involved biologists from the museum, Royal Botanic Gardens (NSW), CSIRO Division of Wildlife Research, and NPWS (NSW). Although the study considered all aspects of Lord Howe's environment and flora and fauna, including its human settlement, some of the most significant work was on the island's birds. Extensive collections of birds were made by John McKean of CSIRO who took specimens without authorisation. As a result, this material came to the Australian Museum. However, the most important work, with the greatest long-term outcomes, were the studies

of the Lord Howe Island Woodhen (*Gallirallus sylvestris*), a critically endangered species, initiated by John Disney and Peter Fullagar (CSIRO). Disney and Fullagar worked on the woodhen for some years and their work eventually led to a successful captive breeding and recovery program established by Ben Miller of NPWS. The woodhen is now listed as Endangered D, with a population of less than 250 individuals (Garnett et al. 2011), a far more secure position than the fewer than 25 individuals restricted to the summit of Mt Gower found by Disney and Fullagar when they commenced their studies.

In 1975, Recher was approached by Harris-Daishowa Pty. Ltd. to conduct an environmental study of the Eden Woodchip Concession in southeastern NSW and evaluate the impact of woodchip logging (effectively clear-felling) on wildlife. This followed an earlier request from the National Trust of NSW for Recher, a member of the Trust's Landscape Conservation Advisory Panel (1971-1986), to comment on the woodchip operation and its likely long-term effects on forest wildlife and ecology. With the assistance of David Milledge and drawing heavily from the work Recher had initiated in 1969 on small mammals and birds in the Nadgee Nature Reserve on the south coast of NSW, Recher prepared a report for Harris-Daishowa outlining the likely environmental impacts of woodchipping and making recommendations for wildlife conservation in the context of the industry (e.g., Recher 1976, Recher et al. 1980).

Milledge subsequently assisted with a number of studies of the ecology of heath, forest, and woodland birds in NSW; these included studies of fire effects on birds at Eden and banding studies of heathland birds in the Brisbane Waters National Park (BWNP) just north of Sydney. Recher also initiated studies of heathland birds in Nadgee Nature Reserve commencing with a survey in 1979 of the heathland avifauna using volunteers from the Cumberland Bird Observers Club in collaboration with the Australian Museum's Walter Boles (Recher 1981a). After the heaths burnt in a wildfire in 1980, Recher monitored the recovery of the heathland avifauna and vegetation until 2000 when the wilderness designation that Nadgee had been put under in 1994 prevented him from continuing work in the reserve (Lunney et al. in press, Recher and Lunney 2003).

When Recher joined the University of Sydney, he initiated studies of birds in the BWNP using the university's Crommelin Field Station (Warrah) as a base. In collaboration with his wife, Judy, he also studied

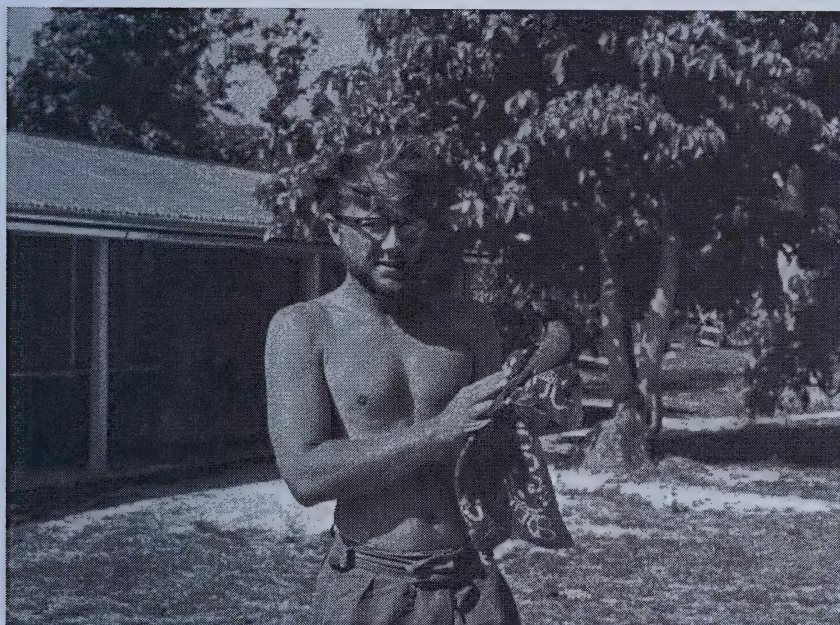


Figure 1. Harry Recher with a Wedge-tailed Shearwater (*Ardenna pacifica*) on Heron Island, Great Barrier Reef, shortly before leaving The University of Sydney and joining the Australian Museum in 1968. (photographer Judy Recher)

Reef Herons (*Egretta sacra*) on Heron and One-tree Islands on the Great Barrier Reef (Figure 1). Recher worked on herons (Recher and Recher 1972a,b,c, 1980) and continued his honeyeater studies at Warrah after joining the museum until his leaving the museum to take up a post in the Department of Ecosystem Management at the University of New England, Armidale, NSW in 1988. Initially his work at Warrah focussed on questions of community composition and bird species diversity (Recher 1969), but soon concentrated on honeyeater (Meliphagidae) ecology and behaviour (e.g., Recher 1971c, 1977b).

In 1980, Graham Pyke joined the environmental studies unit, by then called 'Vertebrate Ecology' and continued his own studies of honeyeaters in the BWNP. The study sites of Recher and Pyke overlapped and they collaborated with studies of honeyeaters (e.g., Pyke and Recher 1986, 1988, Pyke et al. 1993) and bird census

procedures (Pyke and Recher 1985). Recher developed a particular interest in bird census procedures after attending a 1981 conference in Asilomar, California on bird census procedures and subsequently published a number of papers on census methods for birds (e.g., Kavanagh and Recher 1983, Recher 1981b, 1989a, Recher et al. 1983a, Shields and Recher 1985). A similar conference at Asilomar in 1988 on avian foraging reinforced Recher's long-standing interest in avian foraging ecology that had begun with his work on waders at Stanford (e.g., Recher 1966).

Recher's studies in the BWNP were scaled down after he left for the University of New England and then to Edith Cowan University in Perth in 1996. He returned to Sydney in 2003 and was appointed a Senior Fellow of the Museum in 2007. At that time he renewed his studies in the BWNP adding additional sites on the Lower Hawkesbury River where he monitored bird populations, especially honeyeaters.

After completing the environmental study at Eden for Harris-Daishowa, Recher continued studies on forest and woodland birds in the Eden Forestry District. These studies involved bird censuses and studies of nesting and foraging ecology. The census work was conducted throughout the District from 1975 to 1983 (e.g., Kavanagh et al. 1985, Recher et al. 1983b, 1991a) and included studies of bird populations in retained native vegetation in pine plantations (e.g., Recher et al. 1987). The nesting and foraging studies were done on 10 ha plots near Bombala in the Bondi State Forest (e.g., Recher et al. 1985a, Holmes and Recher 1986). Much of this work was funded by Harris-Daishowa and was directed at providing wildlife management guidelines to the NSW Forestry Commission, which was responsible for logging activities in the State Forests in the woodchip concession (e.g., Recher et al. 1980, 1987). Numerous individuals, including Dick Holmes, participated in this work, which was done in collaboration with the Forestry Commission (Figure 2). The principal participants from the museum were Harry Recher, Greg Gowing, and Peter Smith, but others, including Walter Boles, became involved from time to time. Peter Smith, an independent environmental consultant with a strong interest in birds, took over Recher's position while Recher was on sabbatical at the University of California, Irvine during 1978/1979 after having chaired an inquiry into land conservation issues for the State Government during 1977. Smith ensured the Eden program continued in Recher's absence. Renée Ferster (Levy), Rod Kavanagh, Wyn



Figure 2. This photo was taken in the Bondi State Forest, New South Wales in the summer of 1980-81. The tree stump is of a very large Messmate (*Eucalyptus fastigata*) that had been logged as part of forest clearing operations to establish exotic pine plantations. The people are part of the team who worked with Harry Recher on studies of bird ecology in nearby unlogged forest and woodland. In the back, from left to right, are Eve Kavanagh, Peter Dostine, Dick Holmes (standing), Jim Shields, Greg Gowing, Martin Schulz, Rod Kavanagh, John Woinarski (smoking!), and Kristin Bardsley. In the front are Wyn Rohan-Jones and Harry Recher (holding the axe). (photographer Wyn Rohan-Jones)

Rohan-Jones, and Jim Shields, biologists from the Forestry Commission, participated fully in these studies, as well as carrying out other major projects, including some on birds, independent of the museum. All of the museum's south coast work on birds relied heavily on volunteers and short-term research assistants employed on grants or

funded by Harris-Daishowa. These included Tracey Armstrong, Sandy Gilmore, David Milledge, and Martin Schulz.

The Eden studies ended in 1983 after Recher encountered difficulties with the Forestry Commission over articles he had written expressing concern about the impact of forestry operations on wildlife (in particular, Recher 1982). Although Recher's personal involvement ended, his legacy of true conservation continued in the forest management at Eden. Virtually all the recommendations made in Recher et al 1980 to the forest industry have been brought into practice, as well as legislation and regulation. Stream-side corridors, across the ridge corridors, regional ecologists, species specific protection measures, and pre-logging surveys are now part of the standard (and required) practice for forestry, which is monitored and regulated by the NSW Department of the Environment, now the NSW Environmental Protection Authority.

Recher's studies of avian ecology continued on Vacant Crown Land at Scheyville (now the Scheyville National Park) where they were expanded to investigate the interactions between birds and their invertebrate foods (e.g., Majer et al. 1989, Recher et al. 1991b), studies that Recher continues in Western Australia (e.g., Davis and Recher 2002a,b, 2009, Majer et al. 1992, 2006, Recher 2006, Recher and Davis 1998, 2002, 2010, 2011, Recher and Majer 2006, Recher et al. 1996 2002). While still at the museum, Recher's avian studies at Scheyville focussed on Australian warblers (Acanthizidae) (e.g., Recher 1989b), an interest that was continued first at the University of New England (1988-1994) on the NSW Northern Tablelands and then in Western Australia (1986-).

Scheyville was an area threatened by development (housing, waste disposal) and with Wyn Rohan-Jones, Recher, as a member of the NPWS Advisory Council, pushed strongly for protection of the area as a conservation reserve. It was eventually made a National Park, but not until after Recher was forced to oppose plans from NPWS that would have seen a park created excluding all cleared lands leaving a reserve of woodland that would have been totally unmanageable for conservation purposes. This was not the first time Recher had conflict with NPWS over the reservation of disturbed areas; a park embracing a number of otherwise separated pockets of littoral rainforest along the north coast of NSW and the reservation of wetlands and lagoons in the upper Hawkesbury on Sydney's western boundaries met with similar

lack of interest from NPWS staff who seemed (to Recher) more interested in wilderness conservation and bush walking than biodiversity conservation. Neither reserve proposals were acted upon and, as with Myall Lakes, real conservation opportunities were lost.

The forest and woodland bird studies undertaken by the museum's terrestrial ecologists in the Eden Forestry District emphasised the distribution and abundance of birds in relation to vegetation and disturbance history (logging, fire) (e.g., Kavanagh et al. 1985, Recher et al. 1991a) and the resources birds required for feeding and nesting (e.g., Recher et al. 1983b, 1985a, Recher 2004a). Recher was joined in his research at various times by a number of overseas visitors; F. Lyn Carpenter, University of California (Irvine), USA (1978), Richard T. Holmes, Dartmouth College, USA (1980-81), William E. (Ted) Davis, Jr., Boston University, USA (Davis made repeated trips to Australia between 1982 and 2010 to work with Recher, Figure 3), and Yoram



Figure 3. Ted Davis and Harry Recher on Dangar Island in 1982 taking a break from working on thornbills (*Acanthiza* spp.). Recher lived on Dangar Island, which is just north of Sydney, NSW on the Hawkesbury River. Davis and his family rented a house on the island during his time at the museum.

Yom Tov, Tel Aviv University, Israel (1983-84). All received financial support from the museum, as well as their own institutions. The results of these studies contributed to understanding the ecology and behaviour of Australian birds (e.g., Carpenter and Recher 1979, Holmes and Recher 1986, Recher et al. 1983c, 1985a, Yom-Tov 1987) as well as advising on forest wildlife management (e.g., Recher et al. 1980, Recher 1990, 1996, 2004a) and promoting awareness of the urgent need to protect Australia's avifauna (e.g., Recher 1999, Recher and Lim 1990), key elements of the Australia Museum's charter with the community.



Figure 4. Harry Recher in 2006 on one of the study plots near Norseman in the Great Western Woodlands, Western Australia where he and Ted Davis commenced studies of woodland birds in 1997. Recher's work on forest and woodland birds in Western Australia began in 1986 while he was on study leave from The Australian Museum at the Western Australian Institute of Technology, now Curtin University. (photographer Ted Davis)

Just as the museum's ornithological collections are continental in their scope, so too have been the ecological studies of the Australian Museum. On sabbatical at the Western Australia Institute of Technology (WAIT), now Curtin University of Technology, Recher established a series of research projects on woodland birds in Western Australia and began to monitor bird populations in Kings Park, Perth. Ted Davis joined him frequently in the woodland bird studies and together they published a number of papers on the ecology of Western Australia's avifauna (e.g., Recher and Davis 1998; Davis and Recher 2002a,b, 2009)(Figures 4, 5).

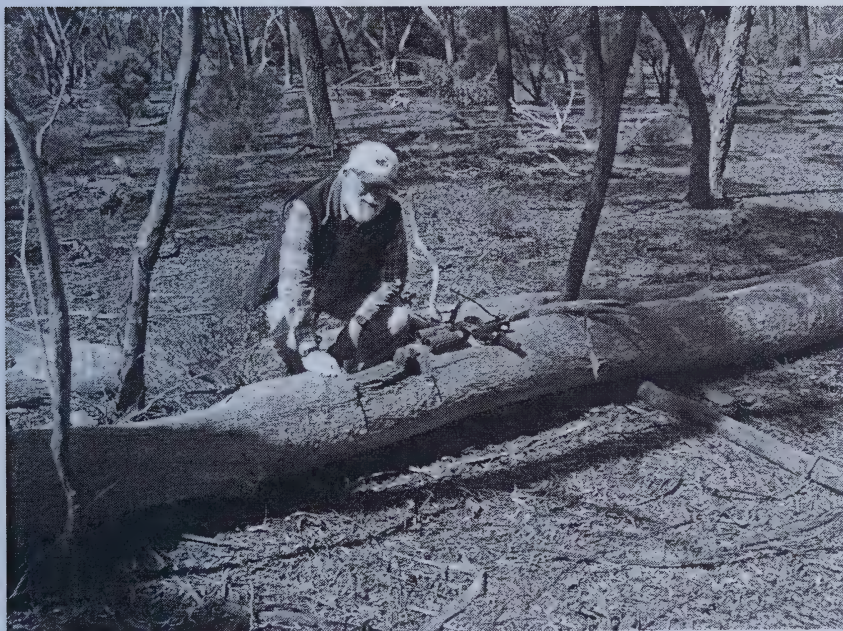


Figure 5. Ted Davis in 2006 inspecting a tree that had been cut down many years previously to extract young parrots or honey from the hollow trunk. Such cuts and felled trees are common in southwestern Western Australia. This one was in the Great Western Woodlands near Norseman and is therefore most likely to have been felled for parrots, as wild honey bees are rare in these semi-arid woodlands. (photographer Harry Recher)

The Kings Park censuses from 1986 were published with Dom Serventy as a paper reviewing the long-term changes in the Kings Park avifauna from Serventy's first counts in 1927 to those by Recher in 1986 (Recher and Serventy 1991). Recher continued to monitor the avifauna of Kings Park whenever in Perth (e.g., Recher 2004b). The opportunity afforded Recher by the Australian Museum to take a sabbatical in Perth was somewhat unique at the time as most study leaves by museum staff involved overseas travel and the only appropriate forms to apply for such leave were for overseas work. To get around the problem, the 1986 sabbatical was described in the application as "overdesert." While at WAIT, Recher established a long-standing research collaboration with Jonathan Majer, an entomologist. Together they began to explore the interactions between canopy and bark invertebrates and birds in Australian forests and woodlands, research that continued after Recher left the museum, but the insect and bird studies carried out in 1987/1988 provided the foundation for all future work (e.g., Recher et al. 1991b, 1996, Recher and Majer 1994). Recher was appointed as an Adjunct Professor at Curtin University in 1996 and at Murdoch University in 2009 reflecting his long involvement with research in Western Australia and his collaboration with university staff at both institutions (e.g., Recher et al. 1991b, 1996, 2002).

While at the museum, Recher co-authored and edited two books. *A Natural Legacy* (Recher et al. 1979, 1986) became a widely used introductory ecology and conservation text at Australian universities. It was based on a series of lectures, *Ecology for Conservationists*, arranged by Recher and held at the museum in response to the opposition he encountered within the environment movement of NSW to his proposals for a broad area conservation reserve at Myall Lakes. Birds feature prominently in the text, with many examples derived from work Recher had conducted himself. David Milledge illustrated the book. The second book, *Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management* (Keast et al. 1985), was based on a symposium of the Royal Australasian Ornithologist's Union (RAOU) and organized by Hugh Ford at the University of New England in 1983. It was published by Surrey Beatty & Sons and for the first time brought together research on the forest and woodland birds of Australia showing how research could be applied to practical matters of conservation and management. It is still widely cited. Allen Keast had the idea to publish

the proceedings as a book and Hal Cogger, Deputy Director of the Museum, recommended the publisher. Keast and Recher worked closely on the editing, ably assisted by Hugh Ford and Denis Saunders, and established an enduring friendship that lasted until Keast's death in 2009. Although Keast and Recher never collaborated on research, they combined data from separate projects to write a paper on the ecomorphology of the Weebill (*Smicrornis breviorstris*) (Keast and Recher 1997). Both were also vocal opponents of changes within the RAOU, which they saw as degrading its role as a professional scientific society, turning it into an Australian version of the American Audubon Society. They also opposed the list of English names adopted by the RAOU for Australian birds, especially as CSIRO had already published a widely accepted list of names for Australian birds (CSIRO 1969). In particular, they objected to the elevation of the name of the genus to the vernacular for birds such as *Gerygone* spp. when well-established and informative English language names were already in use (in this case, "warbler"). Recher refused to follow the demands of the RAOU (later Birds Australia) that its list of names be used in publication and continued to use the established names, eventually refusing to publish in journals where he would have been required to go against his principles. He is presently writing up his research on Western Australian birds as a book.

Recher's contributions to ornithology were recognized by the RAOU, which awarded him the Serventy Medal in 1994. He was made a Fellow of the Royal Zoological Society (NSW) in 2000 for outstanding contributions to zoology. Recher's contributions to the ecological sciences, environmental management and biodiversity conservation, and as an author and lecturer were recognized in 2004 when he was awarded an Order of Australia (AM), General Division. He retired from Edith Cowan University in 2003 as Emeritus Professor and returned to live on Dangar Island just north of Sydney.

Graham Pyke (1949–).—Graham Pyke is Australian-born, but he did his Ph.D. in the USA from 1970 to 1974 (University of Chicago) and was an Assistant Professor at the University of Utah from 1974 to 1977. Having returned to Australia, but prior to joining the Australian Museum, he was based at the University of Sydney for three years (1977–1980) as a Queen Elizabeth II (Postdoctoral) Fellow. During this time he transferred his interests in nectar-feeding animals and the plants

they visit from bumblebees and hummingbirds (Pyke 1978) in North America to Australia's honeyeaters (Pyke 1981b), at the same time changing the plant species involved (Pyke and Waser 1981). At this stage Pyke's focus was on foraging behaviour of the birds and pollination of the plants they visit (Pyke 1980b, 1981c) and some of his early studies involved comparisons between honeyeaters and hummingbirds (Pyke 1980a, 1981e). He subsequently maintained this interest while at the Australian Museum.

As his Fellowship was coming to an end, Pyke teamed up with Harry Recher and together they successfully pursued grants from the ARC and the Ian Potter Foundation to study spatial and temporal variation in honeyeater abundance in relation to such variation in nectar availability. This provided a salary for Pyke and resulted in him commencing employment as a Research Associate at the Australian Museum in November 1980. In 1983, he obtained a permanent position at the Museum as a Research Scientist; he was subsequently promoted to Principal Research Scientist. He maintains an ongoing program of research from this base. He has thus been carrying out research while based at the Museum since 1980, though he officially "retired" in 2007.

After joining the Museum, Pyke developed what had become his two interests in honeyeaters, one involving their behaviour while foraging for nectar and consequent pollination of visited plants, the other involving their population biology in relation to food supply. In terms of honeyeater foraging and plant pollination, his studies had already begun in Brisbane Water National Park (BWNP), a few kilometres from the University of Sydney's Field Station (Warrah) at Pearl Beach and less than 1 km from sites where Recher was also studying honeyeaters (Figure 6). This was a natural starting point for Pyke's studies, as he was then based at the University of Sydney and had, about 13 years earlier, visited the field station as an undergraduate, occasionally assisting Recher with his bird studies at the time. After joining the Museum, Pyke maintained these studies which focused on honeyeaters foraging for nectar on the Mountain Devil (*Lambertia formosa*) (Pyke 1981b) and the Waratah (*Telopea speciosissima*) (Pyke 1981a, Pyke and Paton 1982). In addition, he developed studies of honeyeater foraging and pollination in relation to Christmas Bells (*Blandfordia nobilis*) at Barren Ground Nature Reserve near Jamberoo, NSW (Pyke et al. 1988). Throughout these studies, Pyke hypothesised that individual birds would forage in ways that maximise their net rate

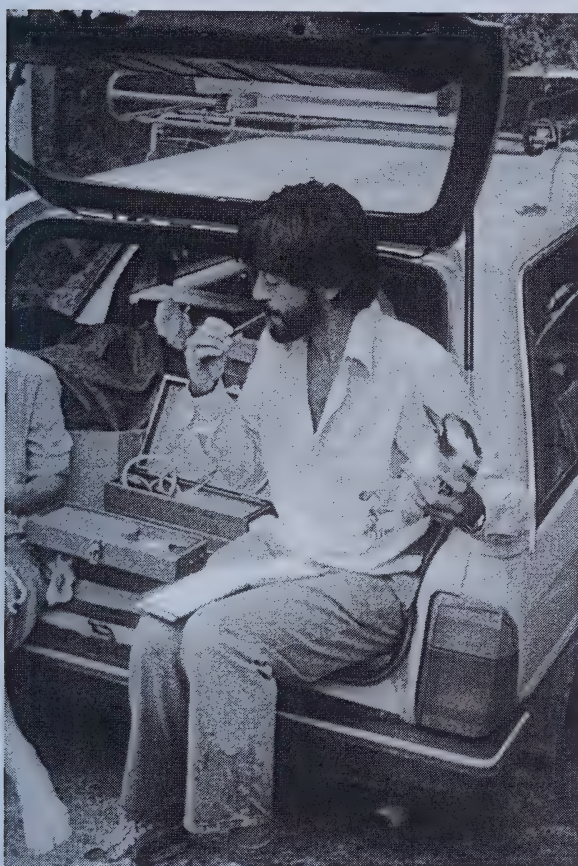


Figure 6. Graham Pyke banding birds at Warrah in 1982. (photographer Ted Davis)

of energy gain (i.e., would forage “optimally”) while individual plants would maximise their own net fitness, being the difference between pollination gains resulting from transfer of pollen both to and from the plant and the costs associated with floral parameters such as nectar production (Pyke 1981d).

Pyke developed his other interest in honeyeater population biology, in collaboration with Recher and others, through studies in

heathland vegetation at several sites around Sydney. In early 1981, he began studies of honeyeaters and their food supply (i.e., nectar and flying insects) in BWNP, centred on two areas, one around sites studied by Recher and subsequently referred to as "Recher Heath," the other adjacent to his own study sites and subsequently known as "Pyke Heath." At the same time, he began studies at sites in the Manly Warringah War Memorial Park and in the West Head region of Ku-ring-gai National Park. In 1990, in collaboration with Richard Major, he established similar studies at North Head, within Sydney Harbour National Park. Throughout these studies Pyke received considerable field assistance and technical expertise from Greg Gowing, who shifted his major responsibilities from Recher to Pyke to Major, with periods when he assisted with collaborative projects of these researchers.

These studies continued until 1991 (see below), but with evolving questions and approaches. Initially, there were circular study plots within which censuses were taken of honeyeaters and other birds, flowers were counted, nectar production measured, and abundance of flying insects assessed. This approach enabled spatial and temporal variation in honeyeater abundance to be compared with variation in food supply (Pyke 1983b, Pyke and Recher 1986, Pyke 1988, Pyke and Recher 1988, Pyke et al. 1993). Subsequently, in 1982, these circular plots were replaced by 10 ha grids, within which birds were captured and banded and their behaviour mapped, thus enabling "resident" honeyeaters to be differentiated from others (Pyke et al. 1989). It was then possible to use radio-tracking to follow the movements of these resident birds and to consider the consequences of territorial interactions between them (O'Connor et al. 1987, Pyke and O'Connor 1993). In the process of carrying out these studies, Pyke developed an interest in methods used to census birds and he published several articles in relation to this issue, some in collaboration with Recher (Pyke 1983a, Pyke and Recher 1985, Pyke 1986).

In 1990, Richard Major joined the Museum and began to collaborate with Pyke on his honeyeater population biology project. Initially Major was employed as a Research Associate on one of Pyke's grants before securing an ARC Postdoctoral Fellowship in 1991. He continued in this role until 1994 when he obtained a permanent position as a Research Scientist at the Museum. The focus of Pyke's honeyeater research at the time Major joined him was on the potential role of territorial behaviour in controlling the density of these birds and the

adopted approach was to temporarily remove known resident birds from their "territories," hold them in captivity for a number of days, and then release them near their original locations, with monitoring of the behaviour of these birds along with that of other nearby resident birds. Unfortunately, as explained below, the results of this research remain unpublished.

A number of additional people have been involved in Pyke's honeyeater research. Those who have made major contributions as research assistants have included Geoff Barrett, Nick Carlile, and Paul O'Connor, with O'Connor having co-authored several articles with Pyke and Recher (O'Connor et al. 1987, Pyke and O'Connor 1993, Pyke et al. 1993). Doug Armstrong did his Ph.D. research on honeyeaters under Pyke's supervision, finishing in 1990 (Armstrong 1990b) and they subsequently co-authored one article (Armstrong and Pyke 1991). Armstrong has also published a number of additional articles based on his Ph.D. honeyeater research (Armstrong 1990a, 1991a,b,c, 1992, 1996). David Paton participated in Pyke's honeyeater research during the early 1980s while holding a Queen Elizabeth II Post-doctoral Fellowship (Armstrong and Paton 1990).

In addition, Pyke campaigned for many years to get the Museum to embrace schemes, involving the general community, which would lead to databases, containing similar information to the Museum's collection-based database, but involving the recording of observations without collection of specimens. One example of such a scheme that Pyke promoted was the Australian Bird Count and he was successful in getting it established at the Museum in 1989, with Stephen Ambrose in charge. However, interest at the Museum in this scheme quickly waned and, after just a year or two, the scheme moved to the RAOU (now BirdLife Australia) office in Sydney, along with Ambrose. Major has subsequently been involved in the similar Birds in Backyards program, but it too is based with BirdLife Australia, rather than at the Museum.

Pyke's honeyeater research essentially ended in 1991 following a motor vehicle accident in April 1991 in which he suffered brain injury. In the immediate wake of this accident, and for about the next two years, he was unable to participate to a significant degree in the honeyeater research and the program subsequently faded away. Between January 1991 and January 1992, while based at the Australian Museum, but funded by a Canadian Government (NSERC) Post-doctoral Fellowship, Ralph Cartar carried out some research on

foraging behaviour of honeyeaters with some initial assistance and guidance from Pyke. However, no publications have arisen from this research. In 1994, not long after he was able to return to research, his interests shifted to frogs and have only recently returned to birds. In 2007/2008 he collaborated with Eduardo Gallo, then a Masters student at Macquarie University, on a project at Warrah that aimed to differentiate between the effects of fire history and the effects of climate change on bird communities by repeating some of the bird censuses that he had carried out in the early 1980s. Articles presenting the results of this research are currently in preparation. In 2011, he began a study on the Eungella Honeyeater (*Lichenostomus hindwoodi*) based primarily on field notes made by an amateur bird-watcher over about a 20-year period as the source of information.

Richard Major (1961–).—Recher's departure from the museum in 1988 led to the appointment of Richard Major who had already begun working at the museum with Graham Pyke. He joined Greg Gowing and Graham Pyke in the Department of Terrestrial Ecology (for reasons hard to understand, this unit has changed names over the years, but terrestrial ecology is as good as any) as a Research Scientist. Major had done his doctorate on the ecology of White-fronted Chats (*Epthianura albifrons*) at Monash University in Victoria (e.g., Major 1991). After arriving at the museum, in addition to his collaboration with Pyke, he developed a series of research projects focusing on urban birds (e.g., Major et al. 1996, Major and Parsons 2010), woodland birds and habitat fragmentation (e.g., Major and Gowing 2001, Major 2010a), and nest predation (e.g., Major et al. 1996, Major and Kendal 1996)(Figure 7). Recently he has used the groundwork derived from his doctoral research near Melbourne to address the conservation ecology of White-fronted Chats in New South Wales (Jenner et al. 2011). Fewer than 50 individuals of this species remain in the Sydney region despite the Sydney population featuring in the writings of several museum ornithologists throughout its history (Ramsay 1863, North 1904, Keast 1958, 1995, Jenner et al. 2011). His special interest in urban birds and the effect of urbanization on birds led to projects in Sydney on Australian White Ibis (*Threskiornis molucca*), Noisy Miner (*Manorina melanocephala*), Common Myna (*Sturnus tristis*), Pied Currawong (*Strepera graculina*), and urban parrots. Major played a leading role in establishing the "Birds in Backyards" program in

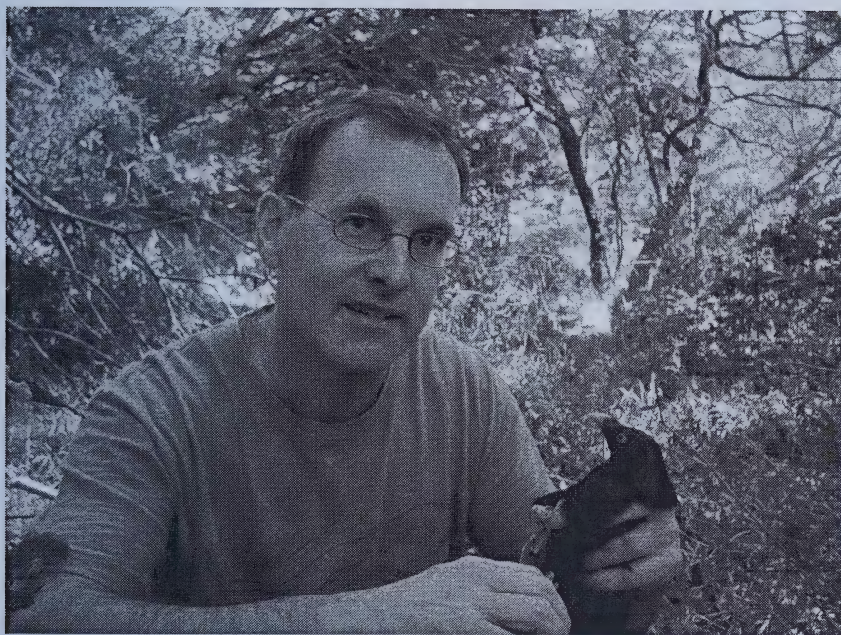


Figure 7. Richard Major in 2007 holding a Satin Bowerbird (*Ptilonorhynchus violaceus*) at Coalcliff in the Illawarra District of New South Wales. (photographer Kris French)

collaboration with Birds Australia (now Birdlife Australia), which seeks to engage broad community interest in environmental issues. Other projects include the role of *Eucalyptus* plantations in conserving biodiversity, historical changes in the avifauna of Sydney (e.g., Major 2010b), and threatened species conservation. Major remains at the museum as a Senior Research Scientist.

Greg Gowing (1954–).—Gowing provided expert technical assistance to scientists within the Terrestrial Ecology Unit over a period of nearly 35 years. Initially, Gowing worked closely with Recher on research projects in Nadgee Nature Reserve and the Eden Woodchip Agreement Area (e.g., Gowing and Recher 1984, Recher et al. 1983b, 1985b), as well as with banding studies in the Brisbane Waters

National Park (e.g., Recher et al. 1985c). Gowing was responsible for developing the capability to sample and quantify changes in the abundance of invertebrates as food for birds and worked with Recher and Jonathan Major (Curtin University) on studies of eucalypt canopy arthropods in eastern and western Australia (e.g., Recher et al. 1993). As Technical Officer, Gowing handled much of the logistics, including equipment hire, maintenance, and personnel, involved with this work. He assisted Pyke with banding studies at Warrah, as well as Pyke's work on pollinator systems. After Recher left the museum, Gowing assisted Major with studies of birds and arthropods in fragmented ecosystems (Major and Gowing 2001) and urban environments (Major et al. 1996). As the museum began to focus on collection based research during the 1990s, Gowing's responsibilities shifted from assisting the

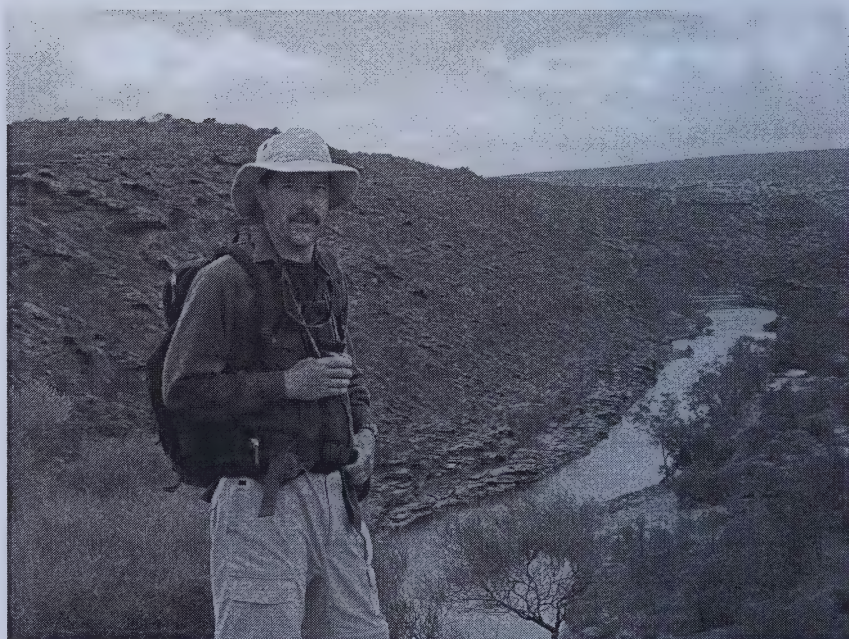


Figure 8. Greg Gowing exploring Kalbarri National Park, W.A. while on holiday in 2003. (photographer Deborah Kent)

museum's terrestrial ecologists to database development and management. He remains at the museum as a Senior Technical Officer in Collection Informatics, but his contribution to field studies from the mid-1970s through the 1990s was exceptional (Figure 8).

THE AUSTRALIAN MUSEUM, ECOLOGY, AND THE ENVIRONMENT

No matter how visionary Frank Talbot's establishment of a dedicated ecology or environmental studies unit at the Australian Museum was, it never sat well with the idea of a museum being first and foremost a repository of collections and the feeling that museum research should be collection based. For whatever reasons, the Australian Museum progressively returned to collection based research and since 1988 the contribution of ecologists, such as Recher, Pyke, and Major, at the Australian Museum has been diminished.

The Terrestrial Ecology Department was finally restructured and ceased to exist on Friday 2 December 2011, with the remaining staff incorporated in a Terrestrial Vertebrates Group. This does not mean the Australian Museum no longer has an interest in the environment or nature conservation. Reading from the museum's web site on 5 December 2011 shows the museum sees that "*Research into biological and cultural diversity provides an objective basis for understanding and making decisions about the environment.*" As examples, the museum relates how collections enable an understanding of how climate change affects the Australian biota and the way collections "*chart the rise, fall and distribution of Australia's biodiversity*" and argues that Museum research helps understand the "*ecological basis of life on Earth.*" However, institutions that house biological collections and the scientists who study them have so far fallen short of such lofty goals (Pyke and Ehrlich 2010). It, never-the-less, remains possible for the Australian Museum, in particular, and museums, in general, to increasingly emphasize relationships between collections and ecological/environmental issues and so increase our understanding of the natural world, while informing its stewardship. Hence, there is considerable potential for emphasis in the role of collections in describing Australia's biodiversity and identifying the elements of that

diversity that are at greatest risk from humans and their exploitation of resources.

Whether collections and the acquisition of collections can ever replace targeted ecological research on the Australia biota can be argued without resolve for as long as anyone cares to engage in the debate. In reality, the two are not exclusive and each depends and builds on the other. To see Talbot's vision wound back and museums retreat into their collections, regardless of whatever new technology is employed in their study, is a step back to a time to when the justification of museums by some was to acquire a specimen of every species before they became extinct (see Fulton, this volume).

Although Major and Pyke maintain an active involvement in research, as does Recher, the number of permanent staff employed as terrestrial ecologists has been reduced. The museum now lacks the capacity to respond as vigorously to the conservation needs of Australia's biodiversity as it did in the 1970s and 1980s when the museum was a premier source of ecological expertise to other government departments, non-government organizations, and the general public. In particular, the advocacy role of the museum for nature conservation that commenced with its involvement with the fledgling NPWS in 1968 and led to Recher appearing as an expert witness in a long series of inquiries (e.g., the Terania Creek inquiry, 1979-1980) and cases in the NSW Land and Environment Court involving forestry (e.g., Eden, Washpool, Chaelundi), as well as giving often contentious interviews to the media, has disappeared.

In allowing the museum to retreat from controversial public involvement, the Museum's Trustees abrogated one of the museum's most important responsibilities—informing and educating the public without fear of political consequences. In not emphasising relationships between its collections and ecological/environmental issues, it fails to satisfy the current interests and concerns of the general community. By not embracing schemes that result in data on the distribution and abundance of animals, including birds, without the collection of specimens, it restricts itself to a narrow base. Every which way, it risks a continued loss of support.

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History of Australian Ornithology in Antarctica and the Southern Ocean

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... animate nature has important scientific, cultural and aesthetic as well as economic functions in the life of man, and ... it is worth his while to avoid depletion of its variety, or over exploitation of its capital stocks (R. Carrick, 1964).

ABSTRACT.—We present a review of Australian ornithological observations and research since early in the 20th century in the Australian sector of the Southern Ocean, Macquarie Island, Heard and McDonald Islands, and the Australian Antarctic Territory. Studies on avian species on land and at sea, the personnel involved, and the institutions and organization they represent are introduced. We approach this initially through a historical perspective and note the role of Douglas Mawson in the exploration of the region and his subsequent influence in the establishment of Australian Antarctic Research programs. Significant observations and research are recorded, but no attempt is made to review all the scientific research reported, although pointers to it are given in the bibliography. Emphasis is given to work undertaken under the banner of the Australian National Antarctic Research Expeditions (ANARE) which commenced in 1947.

INTRODUCTION

The Southern Ocean circles the globe south of about 50°S and bathes the shores of Heard Island and the McDonald Islands (HIMI), a small group of islands about 25 miles (40 km) apart (both territories of Australia) and Macquarie Island, part of the sovereign state of Tasmania, Australia. These small islands 3,283 miles (5,283 km) apart

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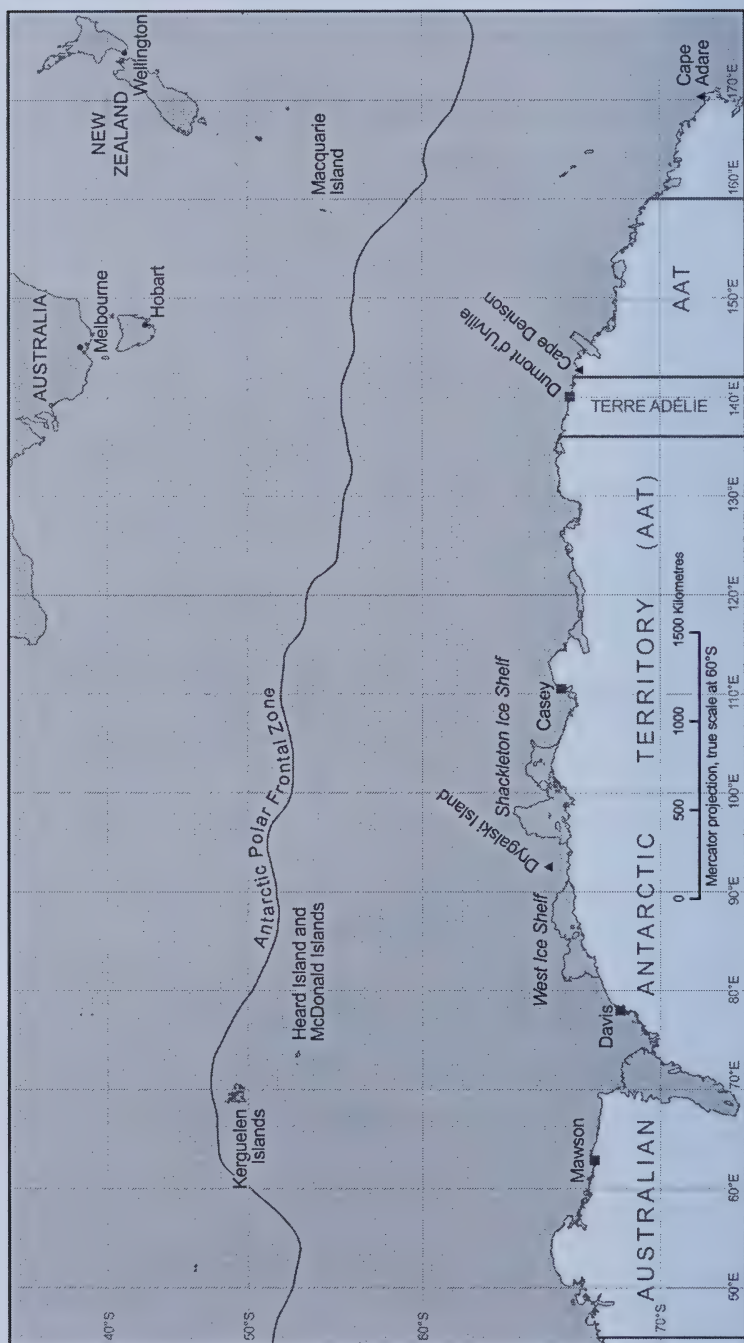


Figure 1. Map showing the Southern Ocean between Australia and Antarctica. The squares indicate permanently occupied Australian Stations on Antarctica. Macquarie Island is also occupied year round. Map produced by the Australian Antarctic Data Centre -Catalogue number 14011.

sit at the western and eastern boundaries, respectively, of Australia, with only sea between them. Like most remote islands at high latitudes they support large colonies of seabirds. There is in general abundant food for the seabirds, but land on which to nest is limited. These islands are remote, with Macquarie Island 957 miles (1,540 km) south-east of Tasmania and Heard Island 2,380 miles (3,830 km) south-west of Western Australia. Antarctica is about 995 miles (1,600 km) south of HIMI. The Australian Antarctic Territory (AAT) encompasses all land and islands south of 60°S and extends from 45°E to 160°E with the exception of the French Territory of Terre Adélie (136°-142°E). The AAT covers an area of about 3.68 million miles² (5.95 million km²) and ice shelves and ice tongues add another 0.09 million miles² (0.14 million km²). The total coast line is about 7,000 miles (11200 km) of which only about 2% is exposed rock (Figure 1).

The area delimited above plus the Southern Ocean to the coast of the AAT forms the geographic region of interest in this review of this subset of Australian ornithology. Here we attempt to record the studies on avian species on land and at sea, the personnel involved and the institutions and organization they represent. We approach this initially through a historical perspective; significant findings are recorded, but make no attempt to review all the scientific research reported, although pointers to it are given in the bibliography.

GEOPOLITICAL HISTORY OF THE REGION

This review of ornithology covers an area in the Southern Ocean and Antarctica first crossed and charted by some of the major exploring expeditions of the late 18th and 19th centuries. The whalers and sealers also explored these waters for commercial gain. An annotated chronological list of Antarctic expeditions, including sealing expeditions, is provided by Headland (1989). A very good and readable account of major voyages of exploration is given in the Reader's Digest's *Antarctica: great stories from the frozen continent* (Reader's Digest 1985). Sealing expeditions to Macquarie Island commenced shortly after its discovery in 1810 by the sealer Captain Hasselburgh (Hasselborough) and are recorded in McNab (1907) and Cumpston (1968). The first official testimony of Heard Island in 1853 and its subsequent exploitation by American sealers is recorded by Bertrand

(1971) and sealing activities in the 19th century by Downes and Downes (2005).

Major exploring expeditions on which ornithological specimens were collected and records were kept include those of Britain's James Cook (1773-1775), the Russian Fabian Gottlieb von Bellingshausen the first to sight land south of the Antarctic circle (1820-1821), Jules Sebastien Cesar Dumont d'Urville who landed and claimed for France part of East Antarctica now known as Terre Adélie (1837-1840), and Britain's James Clark Ross (1839-1843). The collections of birds made at Macquarie Island by Bellingshausen have proven to be particularly important because they include most of the known specimens of the Macquarie Island parakeet which is now extinct.

The British Antarctic Expedition 1898-1900 (Southern Cross Expedition) led by Carsten Borchgrevink was a private expedition to Cape Adare at the northern end of the Ross Sea. It was the first party to winter and maintain biological records on the Antarctic continent (British Museum Natural History 1902). Shortly after, Erich von Drygalski led a German expedition (1901-1902) to spend the winter in their ship *Gauss* close to the Antarctic continent at about 66 °S, 90° E. Although the ship was beset 80 km from the coast, landfall was made by a sledging party. Many of these expeditions called into Australian ports, particularly Hobart.

By the beginning of the 20th century most of the Antarctic seabirds had been named and featured in a number of ornithological collections throughout the world. Many of the breeding localities of each species were recorded but little was known of their breeding biology.

Australians were engaged in Antarctic ornithology in early explorations of the Antarctic continent and the Southern Ocean, but prior to 1901 Australia was a British colony. Australia became an independent nation, the Commonwealth of Australia, on 1 January 1901. This followed the passing of legislation in the British Parliament allowing the six Australian colonies (New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia) to become states within the Commonwealth. In so doing, each state retained the system of government they had developed as colonies, but would have also a Federal Government responsible for matters concerning the Nation as a whole. Prior to Federation all activities pertaining to the colonies were subject to British law as exercised by the Governor of each colony. Macquarie Island was part of Tasmania and following

Federation became subject to Tasmanian State laws. The Australian Antarctic Territory and the Territory of Heard Island were later ceded to the Commonwealth of Australia (herein after referred to simply as Australia) in 1933 and 1947, respectively, and became subject to federal law.

These distinctions are important in understanding state and federal jurisdiction with respect to wildlife management, scientific research, laws pertaining to conservation and protection, (e.g., the Federal *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*), the declaration of HIMI and Macquarie Island to world heritage sites, and the collection, housing, and management of specimens. This was particularly important in the development and implementation of the Antarctic Treaty, signed in 1959 by 12 states including Australia, and later the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) which came into force in 1982.

The northern boundary of the Southern Ocean is the Antarctic Polar Frontal Zone (APFZ) about 19-31 miles (30-50 km) wide, where the cold waters of the Antarctic meet and flow beneath the warmer sub-Antarctic waters. The zone is a natural boundary between two different hydrological regions with distinctive marine life. It meanders around the globe at about 50°S. Macquarie Island is just to the north and HIMI just to the south of the APFZ.

Macquarie Island (54°30' S, 158°57' E) is a small island some 21 miles (34 km) long and 3 miles (5 km) wide aligned north south across the eastward flowing Southern Ocean and the strong prevailing westerly winds. It has no trees and the vegetation is limited to tussock grasses, megaherbs (large perennial wildflowers), and fell field communities. Importantly it has never been part of another land mass, having risen from the ocean floor. The fauna and flora of Macquarie Island are the result of colonization from afar in the absence of mammalian herbivores and predators. Macquarie Island has provided a secure sanctuary for seals and seabirds until shortly after its discovery in 1810 when its isolation was broken and alien species were introduced.

Heard Island (53°S, 73°30'E) was first seen possibly in 1833 by the British sealer Peter Kemp. However, it was Captain John Heard, an American sealer, who officially reported its existence in 1853 (Green 2006). Heard Island is roughly round with a diameter of approximately 15 miles (25 km). It is volcanic in origin and dominated by the conical

mountain Big Ben, 9005 ft (2,745 m) asl. Big Ben is an active volcano and the highest peak in Australia including its territories. The plant communities comprise mainly lichens and mosses, but some vascular plants also thrive here. Vast colonies of seabirds and seals occur on this island (Green and Woehler 2006).

Heard Island and the nearby group of small, rocky islands known as the McDonald Islands, comprise the Australian Territory of Heard Island and the McDonald Islands, commonly abbreviated as HIMI. The *Heard Island and McDonald Islands Act 1953* provides the legislation under which the unique values of this territory are protected.

THE MAWSON YEARS

Australia's scientific studies in Antarctica commenced with the Australasian Antarctic Expedition (AAE) 1911-1914 led by Douglas Mawson (1882-1958). This was Mawson's second expedition to Antarctica; when Mawson first went south he was a member of the British Antarctic Expedition (BAE, 1907-1909) led by Ernest Shackleton (1874-1922) to Cape Royds in the southern Ross Sea. The main objectives of the AAE were "to investigate as far as possible the stretch of prospective but practically unknown Antarctic coast extending almost 2000 miles in an east west direction, between the farthest west of the Terra Nova" (Mawson 1915, p.1) and the farthest east of the First German South Polar Expedition to East Antarctica led by Erich von Drygalski in 1901. The program of Mawson's expedition included the scientific examination of Macquarie Island and also "extensive investigations of the sea floor over the broad belt between Australia and the Antarctic Continent" (Mawson 1915, p.1).

To accomplish the goals of the expedition scientific bases were established. A small hut was set up at Macquarie Island and a wireless station established to maintain contact between Mawson's party in Antarctica and Australia. Among the five men left at the island was the biologist Harold Hamilton who together with geologist and cartographer Leslie Blake roamed the island for two years. While assisting Blake with the mapping of the island, Hamilton recorded, photographed, and collected specimens of the seabirds, seals, and the local vegetation.

The main continental base was built at Cape Denison, Commonwealth Bay ($67^{\circ}0'S$, $141^{\circ}44'E$), and a smaller base, Western Base, was established on the Shackleton Ice Shelf over a thousand miles (1600 km) to the west in Queen Mary Land. The men at Cape Denison spent the winter in preparation for the exploration and mapping of the region in the following spring. The general scientific objectives were the recording of the geology and the charting of an as yet unexplored section of Antarctica. Furthermore, Mawson hoped to locate the magnetic South Pole and planned to carry out extensive geological and meteorological studies. Biological work included the identification of new species and the preparation of study skins. The biologists accompanying the expedition were John Hunter, Charles Laseron (taxidermist) at Cape Denison, and Charles Harrison at the Western Base. Ornithological investigations at Cape Denison concerned the documentation of the distribution and breeding phenology of Adélie Penguins (*Pygoscelis adeliae*) on the McKellar Islets and recording of other species in the region. Of particular interest was the occurrence of breeding Antarctic Prions (*Pachyptila desolata*), also known as Dove Prions. Several specimens were shot and collected (Falla 1937). A second visit to the region during the British Australian and New Zealand Antarctic Research Expedition (BANZARE, 1929-1931), as

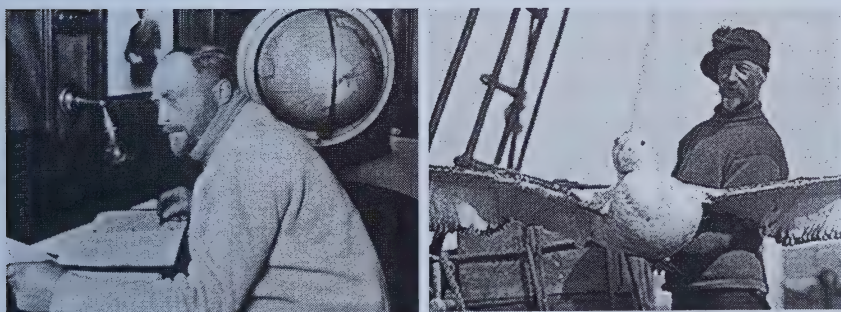


Figure 2. Sir Douglas Mawson on RV Discovery during BANZARE (L) and C. T. Harrison with wandering albatross on the S.Y. Aurora 1911 (R). Harrison was the biologist and artist in Mawson's Western party during the AAE.

well as subsequent visits, has failed to find any evidence that the species is breeding there. There are no other records of this species breeding in greater Antarctica.

Mawson's Western Party discovered the islands known today as the Haswell Islands (66°32'S, 93°0'E) with their rich avifauna. This comprises a large colony of Emperor Penguins (*Aptenodytes forsteri*) "covering several acres of floe" (Mawson 1915, p. 305), Adélie Penguins, Southern Fulmars (*Fulmarus glacialoides*), Wilson's Storm-Petrels (*Oceanites oceanicus*), Antarctic Petrels (*Thalassoica antarctica*) and Antarctic Skuas (*Catharacta maccormicki*). The party dined on Adélie Penguins and Cape Petrel (*Daption carpanse*) eggs (Mawson 1915). Details of the work of the Western Party are provided in an official account in Mawson (1915) but in greater detail in the extraordinarily detailed diaries of Harrisson edited and published by Rossiter (2011) (Figure 2).

In the 19th and early 20th century, birds, seals, and whales in the Antarctic and the sub-Antarctic were exploited in some cases to the point of extermination. Apart from their potential for exploitation little was known of the biology of these species and virtually nothing of the species which were considered of no commercial value. This applied equally to Heard and Macquarie islands and to the Australian Antarctic Territory.

However, the management and conservation of Macquarie Island became a major concern in the early 20th century. The sealers of the 19th century introduced a variety of non-native animals, such as sheep (*Ovis* sp.), cattle (*Bos* sp.), horses (*Equus* sp.), dogs (*Canis* sp.), pigs (*Sus* sp.), cats (*Felis catus*), rats (*Rattus rattus*), mice (*Mus musculus*), Wekas (*Gallirallus australis*), and European Rabbits (*Oryctolagus cuniculus*).

Upon his return from Commonwealth Bay in 1914, Douglas Mawson and H. G. Wells urged the Tasmanian Government to halt all sealing and oiling activities and to protect the unique wildlife at Macquarie Island by proclaiming it a Nature Reserve (Mawson 1922). The Government of the day was not interested and issued a licence for sealing in 1919-1920. After a letter from Frank Hurley (photographer, veteran of Shackleton's and both Mawson's expeditions) in the *Sydney Morning Herald* (14 Aug 1919) caused a public outcry, the Tasmanian Government cancelled the 1920 licence. Mawson and Hurley were supported in their campaign by Clive Errol Lord, a founding member

of the Tasmanian Animals and Bird Protection Board (ABPB). On 13 June 1933, the island was declared a Wildlife Sanctuary by the ABPB under the Tasmanian *Animals and Bird Protection Act 1928*.

The ABPB was established in 1921 and disbanded in 1971. Its role in the management of Macquarie Island is documented in detail by Eric Guiler, a long term member of the ABPB (Guiler 1999). The Board had an advisory role, but limited statutory powers. The full history of the ABPB should be consulted to fully understand its role and powers in relation to the political fabric of Tasmania and the lack of political interest in Macquarie Island. The Board, however, took some interest in the activities of ANARE and attempted to regulate activities there. Permits were issued to allow collection of specimens for scientific purposes. They also regulated the construction of buildings and the introduction of livestock and vehicles.

Although Macquarie Island had been declared a wildlife sanctuary, the Tasmanian Cabinet considered issuing a licence for the resumption of sealing as late as 1958 and the lease of land on which a seal processing and packing works could be established. When the plan was made public, Cabinet was made to wear the opprobrium in silence. The opposition by the ABPB who refused to revoke any part of the sanctuary and the public outcry resulted in the matter being dropped and no licence was issued.

The first Australian National Antarctic Research Expedition (ANARE) established small meteorological and scientific research stations at Heard and Macquarie islands in 1947 and 1948, respectively (see later for details). At that time at Macquarie Island, the populations of Royal (*Eudyptes schlegeli*) and King (*Aptenodytes patagonicus*) Penguins and Elephant Seals (*Mirounga leonina*) were on the path of recovery from commercial exploitation in the 19th and early 20th century. The fur seals (*Arctocephalus* but of an unknown species) had been exterminated and only a small number of fur seals were present. The first pup was born in 1954 and may not have been of the original species. At Heard Island, the sealing activities had devastated the King Penguin population to a point that only eight chicks were found in the period from 1947-1955 (Downes et al. 1959). In 1949, a handful of remaining King Penguins were herded together, captured and transported to Australian zoos (Downes et al. 1959). It was against this background that biological investigations were commenced at Macquarie and at Heard Island.

THE ANARE YEARS

The following presents a summary of the history of ornithological research undertaken under the banner of the Australian National Antarctic Research Expeditions (ANARE). Ornithology was one part of a highly diverse research program that ranged from atmospheric sciences to zoology. Particular emphasis was given to the work of the Australian Antarctic Division (AAD), which provided the logistic support and the core body of scientists who have maintained the continuity of programs and retained the corporate knowledge. ANARE scientists, that is, all scientists including those of the AAD, have published their observations and research findings widely and extensively. However we have been unable to cite all papers. By and large investigations were selected which maintained their importance over many years and have influenced research directions and Australian Government policy.

Post World War II, Mawson urged the Australian Government to consolidate claims to the Australian Antarctic Territory as other nations' activities particularly those of the United States of America were noted with suspicion (Bowden 1997). Australian concerns were heightened by the legal opinion that discovery followed by annexation was insufficient for claiming territory if that were not followed by a subsequent continuity of "effective occupation." After due deliberation (see Bowden 1977) plans were developed to establish a base on the Antarctic Continent after due reconnaissance and also meteorological and scientific research stations on Heard and Macquarie islands. These were to be undertaken under the title of Australian National Antarctic Research Expeditions.

Macquarie Island and Heard and McDonald Islands 1947–1955.—The scientific work conducted at Heard and Macquarie Islands 1947–1955 was undertaken by biologists employed by the Australian Antarctic Division, then part of the Department of External Affairs. In these years, it was difficult to find experienced biologists, let alone ornithologists, willing to spend a year or more in the sub-Antarctic wilderness. Nonetheless, biologists were included in the Heard Island wintering parties from 1949–1951. Biologists on these early expeditions were employed for terms of two to three years. Most were young graduates with enthusiasm, but little experience. Their brief was to

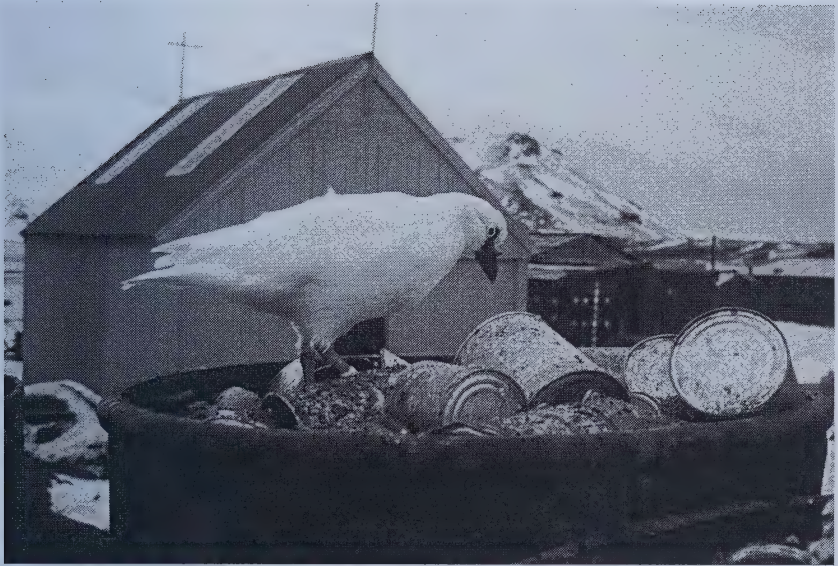


Figure 3. Sheathbill (*Chionis minor nasicornis*) known as a Paddy at Atlas Cove, Heard Island, 1953. This endemic subspecies numbering about 1,000 individuals has been recorded but awaits detailed investigation (see Woehler 2006). (Photographer: Fred Elliot).

document the organisms present and to pay particular attention to the species recovering from exploitation (Chittleborough, pers. comm.) (Figure 3).

In May 1947, Captain Stuart Campbell was appointed executive officer for ANARE. The ANARE staff then consisted of an administrative officer, a storeman, and typists. Today the AAD employs more than 100 scientists to conduct its core research. But in the early years, the scientific officers for the first ANARE were largely recruited from government departments and universities. The scientific programs were co-ordinated and supervised by Phillip Law, a physicist who occupied the position of Chief Scientific Officer; Law became the Director of the Antarctic Division in 1949.

The first operation directed and led by Campbell was the voyage to Heard Island by the HMAS *LST 3501* (later HMS *Labuan*), a 2,300

ton naval vessel (Bowden 1997). The *LST 3501* arrived at Heard Island on 28 December 1947. After a short ceremony the island was claimed by Campbell as a Territory of Australia and the establishment of the scientific base began. That same year on 13 December, HMAS *Wyatt Earp* under the charge of voyage leader Commander Karl Oom left Adelaide to sail to Antarctica via Melbourne and Macquarie Island where a meteorological and geophysical base was to be established. The party on board was then to survey the coastline of King George V Land for suitable locations for permanent continental research stations. If possible, expedition members were to re-occupy Mawson's hut at Commonwealth Bay. However, heavy seas made it necessary to return the ship to Melbourne where she arrived on 7 January 1948. Finally, after a delay of a month the ship set sail on 8 February 1948 to travel to Antarctica and explore the coast. Phillip Law was the chief scientific officer on board. The ship made her way to the Balleny Islands where a number of geological surveys were carried out under difficult conditions. In early March, the ship turned west towards Commonwealth Bay. However, inclement weather and heavy sea ice made it impossible for the party to reach the Antarctic mainland. Given the extensive pack ice and the lateness of the season, the ship was forced to return via Macquarie Island to Melbourne where she arrived on 1 April 1948. A detailed log of bird sightings and other wildlife was kept throughout the voyage.

On 18 January 1948, the *LST 3501* returned to Melbourne and prepared to take on board a party of 13 men plus their supplies to be transported to Heard Island, retrieve the previous wintering party, and re-supply the base for the next season. The medical officer of this party was Arthur Gwynn who returned to the island in 1953. Gwynn also had a degree in Natural Science from Oxford and a keen interest in birds. He was employed by the Antarctic Division from 1948-1955 and devoted much of his time in the sub-Antarctic to the study of the natural history and status of birds and seals (Gwynn 1953a,b).

The Heard Island base was continuously occupied from 1947 until 1955. In the first year, a suitable biologist had not been found to accompany the expedition. Law encouraged Alan Gilchrist, medical officer, to undertake observations of penguins, flying birds, and other wildlife. The practice of making the medical officers responsible for biological studies continued for many years when biologists were not part of an over wintering crew. Gilchrist filmed and photographed

wildlife and kept a detailed log of all birds and other species encountered and published a paper on the occurrence of Snow Petrels (*Pagodroma nivea*) (Gilchrist 1952).

In 1949, biologist Graham Chittleborough wintered at Heard Island and completed his B.Sc. Honours degree. Together with fellow biologist Tim Ealey he started a seal marking program and the two men also undertook extensive population surveys of flying birds, penguins, and seals. They banded chicks of Black-browed Albatrosses (*Thalassarche melanophrys*) (formerly *Diomedea melanophrys*), Subantarctic Skuas (*Catharacta lonnbergi*), and Southern Giant Petrels (*Macronectes giganteus*) to study among other things their life history and distribution (Chittleborough and Ealey 1950, Downes et al. 1959). In 1952, Les Gibbney, who had already wintered in 1950, doubled as biologist and Officer in Charge (OIC). Graham Budd performed the triple act of OIC, medical officer, and biologist in 1954. The biologists also investigated and collected assorted invertebrates, lichens, and mosses and provided detailed studies of species diversity and distribution (e.g., Brown 1964).

The biological work was rather fragmented in terms of species or subject as the men performing the tasks were often not dedicated biologists and had other work commitments. However, the information collected provided a valuable set of observations of species and numbers of vertebrate species present, as well as incidental observations on their biology (Downes et al. 1954, Ealey 1954, Downes and Gwynn 1955, Downes et al. 1959). Other observations included marine hydrology and phytoplankton (Ealey and Chittleborough 1956). These data were incorporated into reports on the biology of Heard Island (Law and Burstall 1953). The bird banding (Chittleborough and Ealey 1950, Downes 1952, Howard 1954a,b) and the branding of elephant seals (Chittleborough and Ealey 1953, Howard 1954b) were pioneering efforts which laid the groundwork for more extensive and long term studies (Carrick and Ingham 1962, 1967, 1970). By 1954, 1,406 seals and several thousand birds had been marked.

In March 1953, the Australian Government announced that an expedition was to be sent to Antarctica to establish a scientific research station. Further in August 1954, it announced the closure of the station at Heard Island to enable the Antarctic Division to transfer research activities to and to fund the soon to be established Mawson station on the Antarctic continent (Bowden 1997). The closure of Heard Island on

9 March 1955 was of considerable concern to the biologists who had made a significant effort in establishing what they believed would become long term studies. Since then, Heard Island has been visited on several occasions (see below), but a permanently occupied base was never re-established.

MACQUARIE ISLAND 1955-1971

Since the closure of the Heard Island station, Australia has established three continental stations: Mawson (1954), Davis (1957), and "Repstat"/Casey (1965), Replacement Station for the American base Wilkes that was handed over to Australia in 1959 and renamed Casey in 1969). However, 1955-1971 saw the majority of the biological research effort centred on Macquarie Island. This island with an area of about 80 miles² (128 km²) is home to large numbers of seabirds, including four species of penguins and four species of albatrosses, various petrels, as well as skuas and cormorants. About one seventh of the world's Southern Elephant Seal (*Mirounga leonina*) population also lives and breeds here.

The driving force to establish Macquarie Island as the primary site for biological research was Robert Carrick (Ca. 1905-1988), a biologist at the Division of Wildlife Research of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and founder of the Australian Bird Banding Scheme (Carrick 1960, Robin 2001). Carrick was fortunate in being able to persuade the chief of the CSIRO Wildlife Survey Section, Francis Ratcliffe, to allow him to supervise biological research on Macquarie Island on behalf of the Antarctic Division and to be given technical officers, on the CSIRO payroll, to support the field programs. Carrick's conviction that deeper insights into the lives of vertebrates would be obtained by long-term studies of marked individuals was far ahead of most other biologists researching in the Southern Ocean at that time (Carrick and Ingham 1967). As sustained access to albatrosses, penguins, and seals was achievable at Macquarie Island, it offered excellent opportunities for long-term studies, especially on seabirds. The studies comprised annual estimates of the population sizes of various species and their distribution, as well as records of breeding success.

Also important was the banding of most bird species to determine their seasonal movements and the reliability with which they returned to the island in the following season. Because of the low return rates of bird bands, large numbers of individuals needed to be marked. One of those mass banding studies focused on giant petrels and several hundred chicks were banded each year (e.g., Howard 1956, Woehler and Johnstone 1988). Penguins and seals were also marked in great numbers.

Carrick consolidated the work on Macquarie Island and visited the island several times, for the first time on a round trip in 1954 and again in 1955 in the company of Arthur Gwynn. Macquarie Island provided the opportunity to extend his research interests in population biology. Carrick's initial efforts were to encourage and extend the work on elephant seals with annual branding of pups, documentation of re-sightings, and routine counts of the population.

Carrick was instrumental in having berths made available to a wide range of senior scientists to visit Macquarie Island, up to six at a time on round trips that allowed three to eight days ashore. Included was the ornithologist Robert Falla (1901-1979), who had been the assistant zoologist on Mawson's BANZARE expedition during which he visited the French sub-Antarctic islands of Crozet and Kerguelen, as well as Heard and Macquarie islands (see Scofield, this volume) (Figure 4). The BANZARE Report which followed remains one of the classic works on the seabirds of the Southern Ocean. In it Falla published for the first time much of the current knowledge on the breeding biology of a large number of species (Falla 1937). He returned to Macquarie Island with Carrick in 1957 to assist with the compilation of a comprehensive report on the birds of the island (Carrick 1959) (Figure 4 and 5).

Carrick's particular scientific interest was the factors that influence long term breeding success and population size. Royal Penguins (*Eudyptes schlegeli*) were chosen for study as they were thought to return to the same breeding territory year after year and to remain generally faithful to their mates. They were also easy to capture and band. He commenced a major research project on a Royal Penguin colony at Bauer Bay (e.g., Carrick 1972). A population of known age birds was established over several years and was then studied in detail through each successive season. During 1956-1967, 884 pairs of adults and over 7,000 chicks were banded (Figure 6).



Figure 4. Robert Falla (L) and Robert Carrick (R) on the beach at Buckles Bay, December 1957. (Photographer M. D. Murray).



Figure 5. Preparing specimens on board the *Discovery* during BANZARE: Harold Fletcher (L) and Robert Falla (R). (Photographer: Frank Hurley).

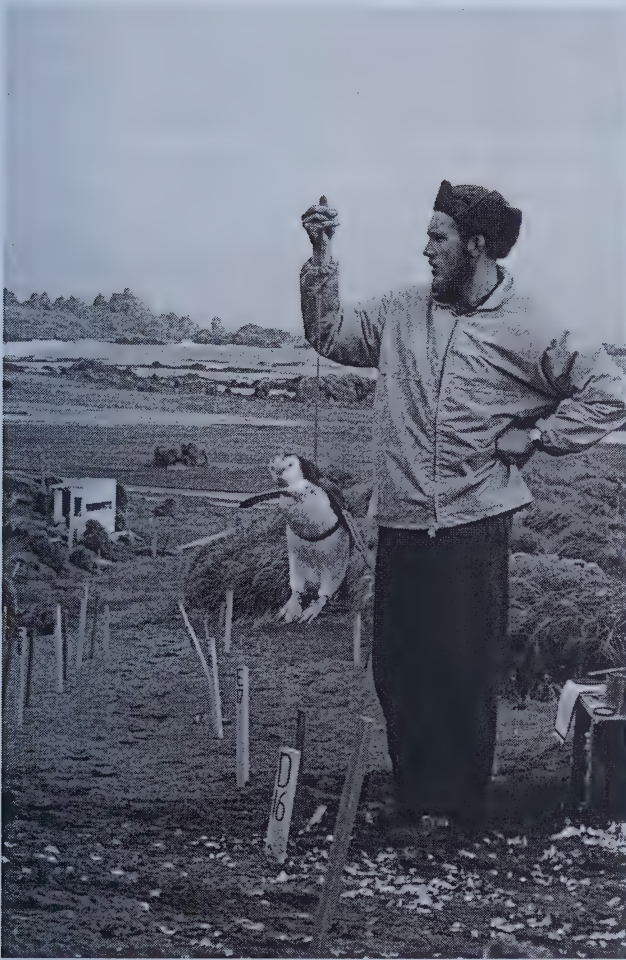


Figure 6. Bill Merilees weighing a Royal Penguin at the Sand Colony, Bauer Bay Macquarie Island 1967. The sand colony was gridded with stakes to follow the movement of marked penguins (See Carrick 1972). The system of weighing should be compared with the automatic methods (Figure 19) employed now.

Some of the more important results of this study were published in 1972 where he contrasted the population dynamics of Royal Penguins with those of the Silver Gull (*Larus novahollandiae*) in South Australia and the Australian Magpie (*Gymnorhina tibicen*) in Canberra (Carrick 1972). He concluded that: "... breeding population size is regulated by antisocial behaviour at a constant level well below the potential that more equitable sharing of resources would permit, and feeding status determines breeding status as well as survival" (Carrick 1972, p. 97).

Carrick was an enthusiastic supporter of sub-Antarctic and Antarctic research. Although he made only a single visit to Antarctica, he was influential in Antarctic affairs, particularly in the Scientific Committee on Antarctic Research (SCAR). He was an ardent conservationist who pushed for science to underpin policy decisions.

In 1966, Carrick completed his field studies and in 1967 he was seconded together with Susan Ingham to the newly established Mawson Institute for Antarctic Research at the University of Adelaide. Carrick retired in 1969 and returned to his native Scotland. All his scientific records were taken with him to allow further publication. After his death they were brought back to Australia by his friend and colleague Mitchell Durno Murray (1925-2009). A veterinary scientist, Murray had a great interest in seabirds and their parasites (Murray 1958, 1962, 1964, 1967; Murray and Vestjens 1967). He also undertook banding programs of Antarctic seabirds at Casey (Murray 1972, Murray et al. 1972).

Susan Ingham, a science graduate from the U.K., was employed by the Antarctic Division in 1956 as a science administrative officer. She strongly supported biological research and maintained a lot of the early biological records. Ingham published a number of papers as sole author on a variety of topics, such as the discovery of Elephant Seals on the Antarctic continent (Ingham 1957), the discovery of Emperor Penguins (Ingham 1959a), the banding of giant petrels (Ingham 1959b), the status of seals at Australian Antarctic stations (Ingham 1960), and uncommon sightings of wildlife at Australian bases (Ingham 1962). In the early 1960s, she joined the CSIRO Division of Wildlife Research. Regardless of location Susan extracted, collated, and cross-checked data from field note books, maintained meticulous records, and assisted with the publication of much of Carrick's work.

From 1959 to 1961, a major contribution to the ornithology of Macquarie Island was provided by John Warham (1919-2010). He overwintered in 1960 spending 15 months as a biologist at Macquarie Island. In 1951, Warham and his wife had left Britain where he had worked for many years in a textile processing plant to observe wildlife overseas. A keen amateur naturalist he had published a book on the birds of Sherwood Forest before coming to Australia (Warham 1951). After having travelled extensively around Australia, Warham was awarded a grant by the CSIRO that enabled him to join ANARE and travel to Macquarie Island in 1959. In 1962, he enrolled at Durham University to obtain his degree in zoology. He returned several times to the island to continue his work on Rockhopper (*Eudyptes chrysocome*) and Royal Penguins, as well as White-headed Petrels (*Pterodroma lessoni*) and giant petrels (Warham 1962, 1963, 1967, 1971, 1972). Bourne and Warham (1966) demonstrated for the first time that the giant petrels breeding at Macquarie Island belonged to two species, the Northern (*M. halli*) and Southern (*M. giganteus*) Giant Petrel. While their breeding ranges overlapped their breeding biology differs (Bourne and Warham 1966).

Warham was also an accomplished photographer and published a book *The Technique of Bird Photography* (Warham 1956). While on Macquarie Island he documented the seabird research and made a colour film called *Sub-Antarctic Sanctuary* about the island that was broadcast on French, Scandinavian, and Australasian television.

Other studies conducted during this period examined aspects of the breeding biology of Rockhopper Penguins, such as mate and site fidelity, based on banded birds (Warham 1963). The population dynamics of Wandering Albatrosses (*Diomedea exulans*) were also investigated by banding chicks. This activity commenced in 1954 (Tomkins 1985) and lasted nearly 30 years (de la Mare and Kerry 1994). The species had been nearly driven to local extinction by sealers and specimen hunters and possibly dogs. The numbers of Wandering Albatrosses breeding at Macquarie Island increased gradually from about 17 breeding pairs in the 1950s to about 40 in the 1970s (Johnstone 1972). This slow recovery is due to the low reproductive rate of the species. It does not reach sexual maturity until about age 13 years and if successful in rearing a chick to fledging does not breed the following season. The greatest number of pairs recorded breeding in

the one year was 26 in 1970/1971. The numbers have since declined because the birds are caught in longline fisheries (de la Mare and Kerry 1994).

Extensive banding programs had commenced in the early years at both Heard and Macquarie Island to establish how far seabirds travel from their natal islands. For example, in 1956-1958 some 2,331 giant petrel fledglings were banded (Ingham 1959b). Despite the low retrieval rates band recoveries bore evidence of the enormous distances these birds travel, particularly straight after they fledge (Ingham 1959b). A surprising finding was the discovery of a Wandering Albatross that had been banded at Macquarie Island but was found breeding on Heard Island (Johnstone 1980).

Robert Carrick had completed his field work in 1966 but he continued to organise the biological field programs for a few more years. In 1969, he employed Gavin Johnstone and Knowles Kerry to undertake seabird research during the winter of 1970. Kerry had worked for Carrick on Macquarie Island in the summer of 1966/1967 on the Wandering Albatross and Royal Penguin programs. When Carrick retired in 1971 and returned to his native Scotland, Knowles Kerry was, on the recommendation of Carrick, given the task by the newly appointed Director of the Australian Antarctic Division, Bryan Rofe, of organising biological research conducted by ANARE. The directive was to transfer the main thrust of the Antarctic Division's biological research program to the Antarctic Continent.

Logistic arrangements in support of field programs on Macquarie Island.—To enable the research on Macquarie Island it was necessary to establish field huts around the island, as the wet and windy climate made using tents difficult. Huts were established at coastal locations to facilitate their resupply by sea. Two of these huts made from recycled aero engine crates and were located at Lusitania Bay and Sandy Bay. However, these huts were inadequate as they were tiny and not well sealed. A reasonable hut was available at Green Gorge. At Hurd Point, there was a small living hut and an auroral observatory hut, both made of wood. These were erected about 1956 for the International Geophysical Year (IGY) 1957-1958 but later proved useful for the study of the Royal Penguin colony at Hurd Point (Figure 7).

Bauer Bay boasted a series of huts, the first near Mawson Point was no more than a coffin-like horizontal box 3.3 ft (1 m) high. This

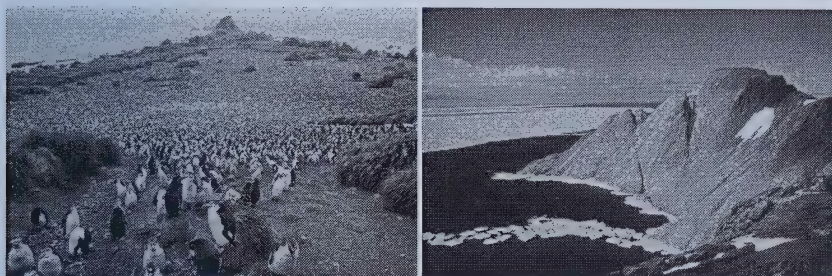


Figure 7. "Birds roam where they like but breed where they can." This gives rise to large aggregations of penguins, for example, Royal Penguins at Hurd point, Macquarie Island (L) and Adélie Penguins and Antarctic Petrels at Scullen Monolith, Antarctica (R). Antarctic Fulmars, Snow Petrels and Wilson's Storm-Petrels also nest on the upper slopes of Scullen Monolith. (Photographs courtesy of AAD).

was used by Kent Keith and Mike Hines in 1956-1957 as shelter while observing Wandering Albatrosses feed their chicks over winter (Carrick et al. 1960). In about 1961, an attempt was made to provide better huts around the island. Aluminium huts were prefabricated in Melbourne and erected at Bauer Bay (Wim's Inn), Prion Lake, and Caroline Cove. These huts had a floor area of 6ft x 8ft (1.8 x 2.4 m) and were 6ft (1.8 m) high (Shaughnessy 1970). They kept the rain out, but due to the lack of ventilation were wet from condensation. In 1965, the hut at Caroline Cove was dismantled and taken to what is now known as Tiobunga Lake and replaced in 1966 with a timber hut (Crabbe Inn). Wim's Inn at Bauer Bay was given a cold porch made of drift wood, but added little to its comfort. It was replaced in 1964 by a hut clad in zinc-coated steel: it had two bunks (The Rex). In 1966, the Parker Royale was built close by. Observation hides were set up at Flat Creek (Figure 8) and near the top of Gadgets Gully to study giant petrels and Light-mantled Sooty Albatrosses (*Phoebetria palpebrata*) respectively.

The field huts needed to be supplied regularly with fuel and food. However, resupplying them often offered serious challenges. The Australian Army through the efforts of Captain Laurie Stokes agreed to support ANARE in 1948 by supplying two amphibious, six-wheel drive vehicles known as DUKWs (General Motors: D = vehicle designed in 1942, U = utility (amphibious), K = all-wheel drive, W = two powered



Figure 8. A make shift hide for studying a colony of Southern Giant Petrels at Flat Creek, Macquarie Island. (Photographer: K. Kerry).

rear axles). These vehicles were used annually until 1971 to resupply the main station at Buckles Bay. They were also used to deliver stores to the beaches on the sheltered east coast, but landing stores in support of ornithological research at Caroline Cove and Bauer Bay on the west coast was hazardous and could not be guaranteed. Attempts in March 1966 to land fuel and food and the necessary materials for the construction of a penguin observatory adjacent to the colony of Royal Penguins at Bauer Bay failed. Fuel drums and building supplies were dumped overboard by the MV *Nella Dan* in the hope they would drift in to the beach, but this only added to the tasks of the scientists to fetch them from distant rocky shores. Following this debacle several overland solutions were tried.

A small, 3-wheel overland vehicle called a Gnat was built by Aimers Mclean & Co. Ltd., Waverly Ironworks, Galashiels, Scotland (Figure 9). It was designed for use on golf courses and large estates and was powered by a 400 cc four stroke engine. In 1966, it was tried



Figure 9. The Gnat, a cross-country vehicle capable of carrying loads of up to 650 pounds. Despite its wide wheels, it caused much damage to the fragile vegetation and its use was abandoned in 1970. Peter Brandt at Island Lake (Photographer: Gavin Johnstone).

at Macquarie Island. This motorised tricycle was fitted with 14 inch (36 cm) wide wheels to give it traction on the muddy ground of the island. The Gnat made the journey to Bauer Bay on the western side of the island, but in so doing damaged the fel field vegetation. Its tracks were still visible many years later, as were the tracks of a cross country motor bike.

The wintering party of 1970 was supplied with three pack horses to support an extended ornithological field program at Caroline Cove and Bauer Bay. The three horses, Brandy, Lime, and Soda, were taken to Macquarie Island on the *Nella Dan* in Indian Remount Horse Boxes and landed by DUKW (Figure 10). After considerable effort in constructing a track around rocky headlands and through coastal

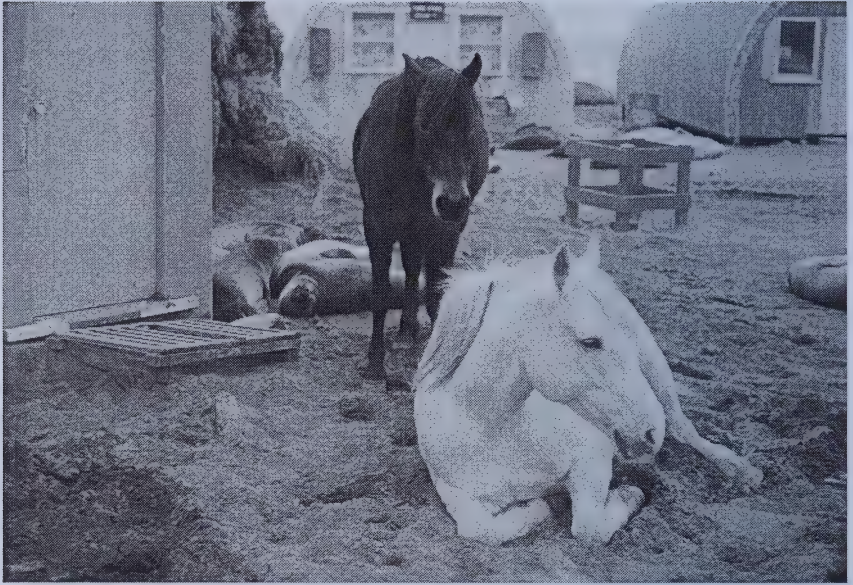


Figure 10. Brandy (L) and Lime (R) at Macquarie Island in the company of young Southern elephant seals, 1970. (Photographer: Brenton Watkins).

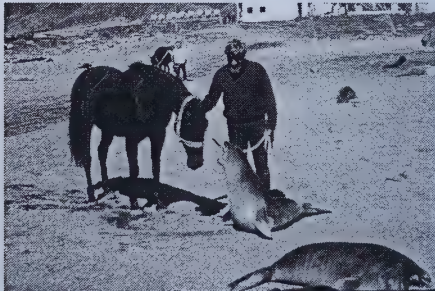


Figure 11. Biologist Knowles Kerry introduces Soda to a pup elephant seal. Macquarie Island, December, 1969. (Photograph courtesy of AAD).

tussock wallows the horses were taken to Sandy Bay on the eastern side of the island, and then up the penguin track to the plateau rim (Figure 11). Unfortunately on the plateau they bogged in the soft turf and could not be taken further. They were returned to Australia in December 1970.

Amphibious vehicles called LARCs (Lighter, Amphibious, Resupply, Cargo) replaced the DUKWs of the Australian Army in 1970 and were better at landing cargo near the huts, but in the end back packing was the only reliable way of visiting and resupplying the out stations. Helicopters and inflatable boats are now used, but weather, the breeding season of the wildlife, and logistic priorities restrict their operations.

HEARD ISLAND 1955–1971

The “permanent” station at Heard Island was closed in 1955, but short visits which provided opportunity for follow up bird studies were made to the island in 1963, 1965, and 1969. The re-colonisation of the



Figure 12. Camp on McDonald Island, 1980. (Photographer: Gavin Johnstone).

island by King Penguins and fur seals was documented (Budd 1964, 1965, 1970). In January 1963, six men landed at Heard Island; half of them were left at Atlas Cove at the northern end of the island, while the others landed at Long Beach at the southern end. Over five weeks, the men visited most known breeding locations of King Penguins and fur seals and banded 1,200 chicks of giant petrels (Budd 1964).

In 1965, a mountaineering expedition, the South Indian Ocean Expedition, arrived at Heard Island and climbed Big Ben for the first time (Budd 1965). While the climbers were underway, Budd collected animal parasites and insects and censused some King Penguin colonies (Budd 1965). In 1960, King Penguins had started to breed again regularly at Heard Island in a number of colonies; their populations were increasing, but still numbered only in their tens (Budd and Downes 1965).

The nearby McDonald Islands were visited for the first time in January 1971 (Figure 12). Attempts in 1965 and 1969 were foiled by inclement weather and the difficulty of landing from the sea. In 1971, the party was ashore for 45 minutes, but noted large numbers of Macaroni Penguins (*Eudyptes chrysolophus*) and fur seals, and numerous burrows of diving petrels (Budd 1972).

MACQUARIE ISLAND 1971 TO PRESENT

The Tasmanian Animals and Bird Protection Board was disbanded in 1971 and the Tasmanian National Parks and Wildlife Service (TASPAWS) came into being and was given the responsibility for the management of Macquarie Island. A year later, the status of the island was upgraded to State Reserve, and in 1978 it was renamed the Macquarie Island Nature Reserve. International recognition of the unique values of the island came in 1977 with the declaration of the island to Biosphere Reserve (DPWH 1991) and in 1997 to the status of World Heritage Area.

Eradication of introduced birds and mammal.—Over the decades, the presence of introduced vertebrates had a devastating effect on the island's flora and fauna (DPWH 1991). Feral dogs had caused havoc among bird populations, particularly among the albatrosses. At least two endemic bird species were lost before 1900: the Macquarie Island

Rail (*Rallus phillippensis macquariensis*) and the Macquarie Island Parakeet (*Cyanoramphus novaezelandia erythrotis*). The rail was still common in the 1880s, but before the turn of the century predation by rats and competition and possibly predation by Wekas had driven it to extinction (Vestjens 1963). The parakeet coexisted with alien predators, particularly cats, for about 70 years after the island's discovery in 1810 as the numbers of predators were kept low through the lack of food during winter. Early sealers and shipwrecked sailors also hunted these birds but their demise came with the introduction of the rabbits in 1879; the food shortage in winter prior to the arrival of rabbits that had kept cat and Weka populations under control no longer existed (Taylor 1979). With plentiful food available all year, the numbers of cats and Wekas increased and with them the pressure of predation on the parakeets (Taylor 1979). Wekas reportedly also preyed on eggs and chicks of petrels and penguins (Carrick 1956) and to some extent on rabbit kittens (K. Kerry, pers. obs.). TASPAWS and its predecessor initiated a series of eradication programs. The Weka population was targeted first and by 1988 the last one was shot (Brothers and Copson 1988). The original population size of Weka is unknown, but their numbers started to decrease as soon as rabbit control started in the late 1970s (Parks and Wildlife Service and Biodiversity Conservation Branch 2007).

In 1956, Carrick observed that the rate of spread across Macquarie Island by rabbits was slow (Carrick 1956, unpubl.) and that they were still scarce in certain areas. Where rabbits were abundant, the vegetation had deteriorated to a point where the rabbit breeding season became limited. Jenkin et al. (1981) set up exclosures at a variety of locations including Green Gorge, Island Lake, and above Perseverance Bluff (Jenkin et al. 1981) as part of the International Biological Program (IBP). The exclosures clearly showed the effect of rabbit grazing on the vegetation. Baiting rabbits with 1080 impregnated oats was tried in 1965 at several locations, but was not successful (Johnstone 1966). In December 1968, the European Rabbit Flea (*Spilopsyllus cuniculi*) was released among the island's rabbit population as a means to spread myxomatosis and control the population (Skira et al. 1983). Although nearly half a million fleas were released, the infestation of individual rabbits was low, with flea numbers less than 100 per rabbit. By 1972, a third of the rabbits captured carried fleas indicating that the fleas had established themselves on the island and had commenced to

breed in the rabbit population (Sobey et al. 1973). Hence, in November 1978, myxomatosis was re-introduced with the Rabbit Flea as rabbit densities were now expected to be high enough to allow myxomatosis to spread (Brothers et al. 1982). At that time the rabbit population was estimated at 150,000 and had caused considerable damage to the vegetation and contributed to localised erosion (Copson et al. 1981, Scott 1988). In following years, the introduction of myxomatosis was repeated and reduced the rabbit population to 5,000-12,000 (Sobey et al. 1973).

In the early 2000s, the effect of rabbit grazing on the vegetation and in turn on the burrows of nesting petrels was so severe that under considerable scientific and public pressure the Tasmanian Government together with the Federal Government agreed to invest up to \$25 million into a rabbit and rodent eradication program that commenced in the autumn of 2010. Aerial baiting with pelleted grain impregnated with the anticoagulant toxin Brodifacoum was carried out during the winter months (May-June) when fewer scavenging species are present. Unfortunately it was hampered by bad weather and was abandoned after approximately 10% of the island had been baited. In addition a large number of birds died of primary or secondary poisoning. These included the scavenging species Northern Giant Petrels (276 birds 7.5 % of estimated population), Southern Giant Petrels (10, 0.2%) and skuas (91, 4.4%). Other species poisoned included Black Duck (*Anas superciliosa*) and Kelp Gulls (*Larus dominicanus*) (see www.parks.gov.au/file.aspx?id=20985). Despite these losses state and federal governments agreed to continue the program with mitigation measures in place. The 2011 season appears to be more successful with preliminary reports suggesting the rabbit population has been reduced to less than 100 individuals. The Calici virus was then introduced into the rabbit population in February 2011 which caused a dramatic reduction in numbers. However, the baiting effort continued in the 2011 winter, and dogs and hunters will remain on the island for another two years to ensure that the eradication is completed.

A cat control program was begun in 1985. The initial cat population was estimated at 250-500 individuals and was reduced to a breeding population of less than 50 by 1998 (Brothers et al. 1985). Over the next two years, a concerted effort was made to rid the island of cats and the last cat was killed in 2000. However, the cats had been present on the island since 1820 and had become part of the food web. Their

removal caused an explosion in the rabbit population. Myxomatosis was no longer an effective control agent and the rabbits, together with rats and mice, severely changed the island's environment (Bergstrom et al. 2009). Significant loss of tussock habitat impacted on burrowing birds including Grey (*Procellaria cinerea*) and White-headed Petrels, and Grey-headed (*Diomedea chrysostoma*) and Light-mantled Sooty Albatrosses, as the loss of vegetation led to landslides that destroyed burrows (Scott and Kirkpatrick 2008). Blue Petrels (*Halobaena caerulea*), Common Diving Petrels (*Pelecanoides urinatrix*), and Fairy Prions (*Pachyptila turtur*) had already become extinct on Macquarie Island because of predation by introduced predators. However, small populations were found breeding on offshore rock stacks (Brothers 1984).

The ecological impact of the removal of the rabbits together with other introduced species is yet to be determined. Recovery of the giant petrel populations from a population decrease due to secondary poisoning is expected. Recolonization of the island by burrowing petrels, such as, White-headed, Grey, Blue Petrels and Short-tailed Shearwaters (*Puffinus tenuirostris*), is also expected to occur, but rapid regrowth of the vegetation may limit nesting sites. If successful, no less than 24 species of seabirds stand to benefit, as it is expected that the loss of tussock and megaherbs will be reversed restoring breeding habitat for seabirds (Parks and Wildlife Service and Biodiversity Conservation Branch 2007). This is a fertile area for future ornithological research.

Ornithological studies.—Although the eradication of introduced species was of overriding importance a large number of other ornithological investigations were undertaken by ANARE scientists. The Tasmanian Parks and Wildlife Service has maintained records of skuas (Skira 1984), giant petrels, the smaller petrels, and albatrosses (Copson 1988) and reported on the status of all species of seabirds (Rounsevell and Brothers 1984). Annual censuses of the numbers of nests of the four species of albatrosses (Wandering, Black-browed, Grey-headed and Light-mantled Sooty Albatrosses) were commenced in 1994 by Rosemary Gales after a decline in the populations of the Wandering Albatrosses (de la Mare and Kerry 1994) and the giant petrels had been observed (Figure 13).



Figure 13. Black-browed Albatross colony on Wireless Hill, Macquarie Island ca. 1970. The colony is now extinct. A small colony still exists at the southern end of the island. (Photograph courtesy of AAD).

The winter diet of Subantarctic Skuas was examined for the first time in 2003 after it had become apparent in 1999 that at least some had remained on the island over winter (Schulz and Gales 2004). Nearly half of their prey items were rabbits, either scavenged or preyed upon directly, while King Penguins were the most important species among their avian prey (Schulz and Gales 2004).

The four species of penguins breeding at Macquarie Island have all been studied with varying degrees of intensity. Census work was undertaken among the Royal Penguins (Copson and Rounsevell 1986) and studies of the breeding biology were carried out on Rockhopper Penguins (Hull et al. 2004). A number of studies focused on the foraging ecology and ecological separation of species. Royal and Rockhopper Penguins feed mainly on euphausiids, but differed in that Rockhopper Penguins take more inshore fish and Royal Penguins more

offshore fish (Hindell et al. 1995). King Penguins feed predominantly on pelagic myctophid fish (lantern fish), whereas Gentoo Penguins take a mixture of myctophid and inshore fish species (Hindell et al. 1995, Robinson and Hindell 1996).

King Penguins, the largest penguins occupying the island, were exploited for their oil to the point of extinction of one colony (Mawson 1943). Regular counts of these penguins commenced in 1930; the surviving colony at Lusitania Bay had increased from approximately 5,000 birds in 1911 (Mawson 1943) to about 250,000 birds by 1980 (Rounsevell and Copson 1982). A new colony of King Penguins developed at Sandy Bay, with the first egg laid in the mid-1970s. Fossil evidence shows that the King Penguins had also bred on the isthmus at the northern end of the island. In 1995, a small newly established colony on the isthmus produced the first eggs there since human occupation of the island. Since then, the colony has steadily increased (van den Hoff et al. 2009).

Satellite tracking studies.—The recovery of banded birds away from their site of banding showed the long distance some birds travelled. Very few banded birds were recovered at sea however and so the movements of foraging sea birds and their routes of dispersal remained largely unknown. The ability to track birds using satellite based technology developed in the late 1980s opened a new field of ornithological research. The at-sea distribution of Light-mantled Sooty Albatrosses during incubation was first examined in 1993. Five breeding birds received miniaturised transmitters which showed these birds headed south towards the Antarctic continent (average distance 942 miles or 1516 km) where they presumably foraged. Thus, their breeding and feeding areas were much greater distances apart than anticipated (Weimerskirch and Robertson 1994).

Royal and King Penguins were satellite-tracked during incubation in the mid- to late 1990s to determine their foraging areas and to examine the relationship between feeding grounds and oceanographic features. Both species foraged offshore and their foraging activities were linked to the Antarctic Polar Frontal Zone (Hull et al. 1997, Wienecke and Robertson 2002, Sokolov et al. 2006).

More recently, the at-sea distribution of both species of giant petrel was examined through satellite tracking. Being scavengers, these birds frequently accompany fishing vessels where mortal interactions with

fishing gear are always possible. During the chick rearing season, adults of both species spend much of their time in the Marine Protected Area surrounding Macquarie Island (Treblico et al. 2008). Fledgling giant petrels appear to be particularly vulnerable, as they spent much of their time in fishing zones outside of the area managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), and subject only to management by regional fisheries who do not require or enforce by catch mitigation measures and whose observer coverage is less than on Antarctic fishing vessels (Treblico et al. 2008).

HEARD ISLAND 1972–2004

In this period, a number of expeditions visited the island of which some were privately funded and others were part of the ANARE research effort. In March 1980, the Division of National Mapping conducted bathymetric surveys near Heard Island and the McDonald Islands and took aerial photographs of the islands and nearby shoals so that the islands' coastlines could be mapped accurately (Veenstra and Manning 1982). Various other activities were also carried out including ornithological surveys and measurements of phytoplankton growth and abundance. A small party of scientists was given the opportunity to work ashore on both Heard and McDonald Islands. Because of the infrequent visitation of the island, a number of researchers had requested the opportunistic collection of information. For example, Gavin Johnstone from the Antarctic Division was keen to learn about the distribution and abundance of wildlife, especially King Penguins whose population was considered to be still recovering from exploitation. Johnstone reported 569 King Penguin chicks in March 1980 where only 104 were observed in 1969 (Johnstone 1982).

A visit to the McDonald Islands revealed that Black-browed Albatrosses and some other previously unreported species were breeding there (Veenstra and Manning 1982). Trapping for rodents on both Heard Island and the McDonald Islands failed to find any. It was concluded that these islands, in contrast to virtually all other sub-Antarctic islands, were free from introduced vertebrate species.

In January/February 1983, a mountaineering expedition visited Heard Island for 4.5 weeks on the yacht *Paternella*. The main aim was

to climb the island's highest peak, Big Ben. As on the previous climbing expedition, the locations and numbers of various seabird species and seals were noted (Vining 1983).

ANARE mounted a scientific expedition to Heard Island in 1985, which was the first of three consecutive summer programs with a focus on biological work. It was the first time since the 1950s that a team of scientists worked at two locations simultaneously to study the population of elephant seals. As on previous occasions, all bird species were recorded in detail. King Penguins were still increasing in numbers (Burton and Williams 1985). In November 1986, another ANARE expedition arrived at Heard Island where the team stayed for two months. The thrust of this expedition was scientific and included geological, archaeological, and biological programs. The geologists were especially interested in the lava of a recent eruption of Big Ben (Barling 1990), while the archaeologists surveyed the beaches and the old station site at Atlas Cove (Lazer and McGowan 1989).

Among the biologists were Rosemary Gales and David Pemberton who determined food consumption and energy requirements of all four penguin species breeding at Heard Island (Klages et al. 1989, Klages et al. 1990, Gales et al. 1993). Some findings were similar to those from Macquarie Island. Rockhopper and Macaroni Penguins both hunted mainly for fish and euphausiids (krill), but the relative proportions and prey species differed in the diets of these two penguins. Macaroni Penguins also ingested prey generally larger than that taken by Rockhopper Penguins. The greater variety in diet among Macaroni Penguins may contribute to their greater abundance (Klages et al. 1989). King and Gentoo (*Pygoscelis papua*) Penguins also fed mainly on fish, but King Penguins specialised in offshore myctophids (lantern fish), while Gentoo Penguins remained closer to shore feeding on fish and crustaceans (Klages et al. 1990). Comprehensive seabird surveys were also undertaken and the increase in King Penguin numbers and status of the Heard Island Cormorant (*Phalacrocorax atriceps*) were documented (Pemberton and Gales 1987, Gales and Pemberton 1988) (Figure 14).

In 1987/1988, the population study of Southern Elephant Seals at Heard Island was continued and a census of seabirds conducted (Woehler 1991). Many birds that had been banded at Heard Island and elsewhere were sighted that summer. Among them were 19 Southern Giant Petrels banded as chicks in 1963 and were then in their 25th year



Figure 14. King Penguins at Heard Island, December, 2003. (Photographer: Barbara Wienecke).

(Kirkwood et al. 1995). Pellets regurgitated by Heard Island Cormorants had been collected during several visits including the 1980 expedition. The diet of these cormorants comprised fish and many benthic organisms and proved to be quite different to the diets of *Phalacrocorax* species elsewhere (Green et al. 1990).

The year 1990 was an important year for the Antarctic Division as for the first time a multi-purpose ship had been constructed for, and dedicated to, Antarctic operations. Australia's first and only icebreaker, the RSV *Aurora Australis*, 308 ft (94 m) long, with a weight of 3,900 tonnes, was built to function as a platform for marine sciences, as well as a re-supply vessel for the three continental stations. She was launched in 1989, but her delivery to the Antarctic Division was delayed. Her first marine science cruise had been scheduled for Prydz Bay, East Antarctica, but because of the unexpected delay the decision

was made to carry out the work around Heard Island instead. It was the first time since the 1950s that ANARE members set foot on the island during the austral winter.

On 16 May 1990, a party of four was landed at Spit Bay: Ken Green, Geoffrey Moore, Matthew Stewart, and Vera Wong. In the following five weeks, work was conducted that included population surveys of mammals and birds at the southern end of the island, as well as a study of the diet of fur seals. A first attempt was made to establish the foraging areas of King Penguins during winter by deploying radio transmitters on 18 adults. Position fixes were obtained through two shore based stations and the ship at sea. Unfortunately only 8 signals were detected at sea. The King Penguins gradually disappeared from the beaches during the 17 day tracking period and were not seen again (Green 1990). The few positions that were obtained indicated a wide dispersal of King Penguins in winter and laid the foundation for a more comprehensive study in 1992/1993.

From February 1992 until March 1993, expedition leader Attila Vrana, biologists Ken Green, Geoffrey Moore, and David Slip, and medical officer Erwin Erb wintered at Heard Island. This expedition was remarkable not only because of its extended duration, but also because the team trialled the use of wind power under sub-Antarctic conditions. For three months a small, two-bladed turbine produced most of the energy required by the expedition personnel (Guichard et al. 1995). Other than the usual surveys of mammals and birds, the biologists also engaged in a detailed study of the breeding biology and foraging ecology of various taxa.

King Penguins were one major focus. Their still expanding population and their protracted breeding cycle made them an attractive subject. Throughout the year, dive recorders were deployed on adult penguins as they went to forage. Inbuilt geo-locators allowed the determination of some of their positions at sea and confirmed the results of the preliminary radio tracking from 1990; during the summer months, King Penguins forage mainly east of the island, but in winter they appear to head south towards the ice edge (Moore et al. 1999). The diet of these penguins also changed with season; in summer, the diet was dominated by lantern fish, especially *Krefftichthys anderssoni*, as previously reported. In late winter, when the chicks are developing, Mackerel Ice Fish (*Champsocephalus gunnari*) accounted for 17% by mass of the chicks' diet (Moore et al. 1998). The finding is important

as Mackerel Ice Fish is one of the species commercially fished around Heard Island.

After the activities in the 1980s and 1990s, the next major research expedition to Heard Island occurred in the summer of 2000/2001. Some 55 researchers and support personnel were located at different sites and undertook 22 research projects, which included archaeology, botany, genetics, glaciology, human impacts, and zoology. As in previous years, seal and seabird censuses were conducted across most of the island.

The most recent major research effort took place in the summer of 2003/2004 when 28 scientists and support staff engaged in wide ranging fields of research. A number of population surveys were again conducted, but the emphasis of vertebrate research was on the satellite tracking of predators and the determination of their diets. While seals, albatrosses, and penguins were foraging, the RSV *Aurora Australis* conducted a comprehensive cruise off the island to locate preferred foraging areas. For Black-browed and Light-mantled Sooty Albatrosses it was the first time that satellite tracks were recorded. During chick rearing, Black-browed Albatrosses largely remained in the Economic Exclusion Zone (EEZ) around Heard and McDonald Islands compared to the Light-mantled Sooty Albatrosses that foraged south of the islands along the southern boundary of the Antarctic Circumpolar Current. While the commercial fishing activities are limited in the EEZ, the albatrosses are at risk of being caught by illegal vessels operating in the Southern Ocean (Lawton et al. 2007).

Among Macaroni Penguins (*Eudyptes chrysolophus*) changes in behaviour were recorded from the crèche stage to the guard stage. Foraging trip durations increased significantly and with it the distance the birds travelled to forage. Some individuals switched between the near-shore and offshore strategies. Two species of krill and the lantern fish *K. anderssoni* were the major components in their diet, but the lantern fish were chiefly caught on the offshore trips (Deagle et al. 2008). The foraging ecology of King Penguins was also studied during the 2003/2004 summer. Twenty-one King Penguins tracked during incubation explored an area of about 48,470 miles² (78,000 km²), but much of the King Penguin foraging activity was concentrated in a region of about 808 miles² (1,300 km²) nearly due east of the island. The majority of their foraging dives reached depths of 230-295 ft (70-90 m) and their diet was virtually exclusively *K. anderssoni* and squid (Wienecke and Robertson 2006).

As the global climate changes so does that of Heard Island. Glaciers have retreated markedly since the 1950s and are still receding (e.g., Thost and Truffer 2008). How these changes affect the wildlife at Heard Island will have to be determined in future studies.

THE ANTARCTIC CONTINENT 1955–1972

Biological research in the Antarctic in these years was not considered important by the Australian Antarctic Division although the director, Phillip Law, was keen that data on vertebrate populations were collected. In the absence of professional biologists, biological studies in Antarctica were by default left to expedition personnel—often the medical officers—to pursue as their interests as time dictated. In many cases, the biological surveys were managed by the medical officers at the various stations. Surveying seabird colonies was usually considered a desirable task as it offered the opportunity to explore the outdoors. Reasons for the lack of interest in biology can be attributed to a number of causes. There was a strong legacy from the International Geophysical Year (IGY) that gave ascendancy to the physical sciences, particularly upper atmospheric and cosmic ray physics and glaciology. Shipboard accommodation was limited and usually taken by those involved in logistic support, exploration, mapping, and surveying. Further, there was little pressure from academic institutions and the strong and well-supported biology program on Macquarie Island tended to attract what interest existed.

Only three biologists had wintered on Australian continental stations by 1972. John Bunt carried out hydrological and phytoplankton studies in 1956 at Mawson. On the way to Mawson, the ship called in at Casey Station (then Wilkes) where Bunt was among the first to discover a breeding colony of Southern Giant Petrels on the Frazier Islands, one of only four known breeding locations of this species in East Antarctica. Botanical studies were undertaken at Mawson by Rowan Webb in 1969 and population studies of the Adélie Penguin were conducted at Wilkes by the American scientist Richard Penny in 1959 and 1960. Wilkes was initially an American Base established for the IGY. It was handed to Australia in a ceremony 4 February 1959. A replacement station was built nearby and named Casey on 19 February 1969. As many medical officers were keen naturalists they spent much

of their time gathering biological data. Graham Budd, medical officer at Mawson in 1959, conducted studies on the effect of cold on his colleagues working and sledging in Antarctica (e.g., Budd 1966). Budd became interested in Emperor Penguins. He investigated their breeding biology and conducted censuses in colonies at the Mawson Coast (Budd 1961a,b,c, 1962). Other notable investigations include those of Brown (1966) on the breeding biology of Snow Petrels.

A strong perception existed within the Antarctic Division that there was very little living on the Antarctic continent except seals and birds. Biological studies were not actively encouraged, although many studies were published as a result of personal interests among expedition staff. When the decision was taken in 1971 to establish a biological research program in Antarctica it took a considerable effort by Kerry to effect a change in the thinking of many of the Antarctic Division staff that such a step was indeed worthwhile. Two documentary films, *Antarctic Winter* and *Antarctic Summer*, were released for television in 1973 and were helpful in gaining interest in Antarctic biology. These were filmed in 1972 at Mawson by cosmic ray physicist David Parer and produced in Melbourne by Ken Taylor (ABC) and Knowles Kerry (AAD). These films took an ecological approach to showing the fauna and flora of Antarctica and were popular world-wide on commercial television.

THE ANTARCTIC CONTINENT 1972 TO PRESENT

Starting in 1972, a greater research effort in the biological sciences was focused on the Antarctic continent and in 1979/1980 a program of ship-based marine research was added. Seabirds at sea were recorded to varying degrees of accuracy on most ANARE voyages (Johnstone and Kerry 1976) and atlases of occurrence of species have been produced (Woehler 1990, 1993). Reid et al (1999) recorded the occurrence of penguins at sea. Some seasonal variations were noted in the distributions of flying birds and a general decline in albatrosses noted (Woehler and Croxall 1996). Short-tailed Shearwaters from south-eastern Australia, which migrate to the north Pacific, were observed feeding on krill in Antarctic waters (Kerry et al. 1983, Nicholls et al. 1998) and later were shown to forage there for their chicks (Klomp and Schultz 2000). Estimates were made of the distribution and biomass of birds, and food consumed by them. The

consumption of marine living resources by the 23.6 million breeding pairs of Southern Ocean penguins (biomass of about 243,000 tonnes) was estimated to be 3.7 million tonnes of fish, 14 million tonnes of crustaceans and 540,000 tonnes of squid (Woehler 1995).

Flying seabirds, particularly the fulmarine petrels, were studied intermittently at some of their colonies. A comparative study of the pre-laying behaviour of Antarctic Petrels and Southern Fulmars was conducted at Odberet and Ardery Islands, near Casey Station. It was noted that the pre-laying activities among Antarctic Petrels were noticeably more compressed than in fulmars (Luders 1977) and that Antarctic Petrels performed a pre-laying exodus while fulmars tended to remain at their nests (Luders 1977). The breeding biology of these two species was comprehensively investigated at the same location over three consecutive summers from 1996/1997 to 1998/1999 (Creuwels et al. 2008). Although the length of the breeding periods of these two species was similar, Antarctic Petrels commenced laying more than two weeks earlier than fulmars. The delay among the fulmars may be related to an inability to cross vast areas of pack ice requiring them to delay the onset of their breeding season so that chicks can be fed when the sea ice has retreated (Creuwels et al. 2008).

The regional distribution and habitat selection of snow petrels was investigated at the Windmill Islands near Casey Station in 2002/2003 and in the Mawson region in 2004/2005. Snow Petrels were found at most ice-free locations throughout the survey area, although over 80% of active nests were found at the more southerly sites (Olivier et al. 2004) (Figure 15). Habitat quality was described in terms of substrate and topography and two different sub-regions (islands and inland mountains) were identified (Olivier and Wotherspoon 2008).

At Hop Island, near Davis Station, the energy requirements of chicks and the parental effort invested in the offspring were similar for Antarctic Petrels, Southern Fulmars, Cape, and Snow Petrels. Despite fast growth rates among their chicks and a highly condensed breeding cycle, these petrels appear not to work harder than petrels whose chicks develop more slowly (Hodum and Weathers 2003). Investigations at Ardery Island found that Antarctic Petrels feed mainly on the Antarctic Silverfish (*Pleuragramma antarcticum*) and krill (*Euphausia superba*) and that squid were only minor components of their diet (van Franeker and Williams 1992). They suggest that the combination of the offshore



Figure 15. Snow petrel found breeding on Ardrey Island, Windmill Islands, Budd Coast, 16 years after being banded, 1984/1985. (Photographer: Rowan Butler).

feeding habits of this petrel and the low energy content of krill make krill unsuitable as prey for chick-rearing.

Ecosystem monitoring and CEMP.—The Convention on the Conservation of Antarctic Marine Living Organisms (CCAMLR) came into force in 1982 and provided the means to regulate Antarctic fisheries. It was the first fisheries management organisation to adopt an ecosystem-based approach to regulating commercial fishing operations. The headquarters of the Commission and Scientific Committee established under the Convention is located in Hobart, Tasmania. Australia has been heavily involved in the work of the Commission, the Scientific Committee and the standing and ad hoc working groups. Scientific studies contributing to the work of CCAMLR are a major part of the work of the Australian Antarctic Division and have included fisheries management and ecosystem monitoring.

Given the requirement that CCAMLR manages fisheries in an ecosystem context it was necessary to take account of the effects of fishing not only on target species, but also on dependent species in the Southern Ocean ecosystem (Agnew 1997). The Commission gathered data, for example, on fish catches and effort, biological data on the fish caught, as well as information on by-catch species which included seabirds. Importantly, it also recognised the need for biological and ecological information on species dependent on the commercially exploited resources (Kock 2000). Thus, in 1985, CCAMLR established the CCAMLR Ecosystem Monitoring Program (CEMP) with the objectives (1) to detect and record significant changes in critical components of the marine ecosystem within the Convention area, and (2) to distinguish between changes both physical and biological due to harvesting of commercial species and changes due to environmental variability. The program identified prey species, predator species, study sites and integrated study regions for monitoring, and developed standard methods for data collection (CCAMLR 1997), as well as data handling and analysis. Field work and data collections are carried out by Member States. For further details on CCAMLR and CEMP see Agnew (1997), Constable et al. 2000 and www.CCAMLR.org.)

Scientists within the Australian Antarctic Division established a long term monitoring program at Béchervaise Island (67°35'S, 62°48'E) near Mawson Station, Antarctica (Figure 16). This program centred on Adélie penguins as a major predator on krill. The approach taken was to study in as great detail as possible the breeding biology and foraging ecology of the species in addition to recording the variables required by CEMP and to look for and explain changes over time. The Australian CEMP program commenced in 1990 (Kerry et al. 1993) and has continued on an annual basis ever since.

Each year, on Béchervaise Island, life-history parameters of Adélie Penguins are recorded and are supplied to CCAMLR. These include adult weights on arrival at the beginning of the season, duration of incubation shifts, foraging trip durations, demography, diet, and chick weights at fledging. These data are obtained by automated means using an automated penguin monitoring system (APMS) designed and built by the Antarctic Division (see below).

Annual counts are made throughout the breeding season to determine the number of pairs attending the colony and attempting to breed, the number of eggs that hatch, and the number of chicks that



Figure 16. Field camp on Béchervaise Island near Mawson, Antarctica. The shape of these fiberglass huts ensures that no matter the direction of the wind they remain snow free. Adélie Penguins are in the fore ground. (Photograph courtesy of AAD).

fledge towards the end of summer. In the absence of a commercial krill fishery in the eastern Antarctic sector, the variability in breeding success can be attributed to changes in food abundance (Nicol et al. 2008) and to environmental factors, particularly sea ice cover adjacent to the colony (Irvine et al. 2000, Clarke et al. 2002, 2006, Emmerson and Southwell 2008). Above average sea ice cover is linked to a greatly reduced breeding success (Irvine et al. 2000, Clarke et al. 2002).

Adélie Penguin research.—Studies on the diet and foraging ecology of Adélie Penguins in the Vestfold Hills were conducted during the 1980s (Green and Johnstone 1988, Whitehead et al. 1990, Puddicombe and Johnstone 1998). At these locations, Adélie Penguins raise their chicks mainly on Chrystal krill (*Euphausia crystalloporhias*)

rather than on Antarctic Krill (*E. superba*), the species of krill subject to commercial harvesting. This was presumably due to the distance the birds have to travel to find the Antarctic Krill which occurs along and to the north of the continental shelf. The monitoring program at Béchervaise Island, however, showed that the composition of the diet varied from year to year, as well as with the gender of the bird and the breeding stage in each season (Clarke et al. 2002). Antarctic Krill and Antarctic Silverfish (*Pleuragramma antarcticum*) were the major items of prey of the penguins from Béchervaise Island. Satellite tracking and diet studies highlighted the potential of direct interaction of foraging Adélie Penguins with a krill fishery (Kerry et al. 1997). During incubation, female Adélie Penguins venture 125-186 miles (200-300 km) from their colonies to forage for krill just north of the continental shelf. In comparison, during the guard stage Adélie Penguins travel to the edge of continental shelf some 50-75 miles (80-120 km) from the colonies, but also forage within about 12 miles (20 km) (Clarke et al. 1998).

When fledglings first leave the colony at the end of the breeding season the young birds travel west thousands of miles but tend to remain in the pack ice zone. Adults after completing their moult follow the fledglings to the west. They tend to spend the winter in the pack ice slowly moving westwards with the currents before they head eastwards back to Béchervaise Island for the next breeding season (Clarke et al. 2003). The winter foraging trips may cover as much as 3,100 miles (5,000 km).

Demographic studies on tagged birds enabled the construction of a life table for Adélie penguins at Béchervaise Island. The predicted age to which 10% of chicks of an average cohort will survive was 13 years (Clarke et al 2003).

Emperor Penguin studies.—Regular census work on this species had nearly come to a halt in the late 1970s and 1980s. However, in 1988, Graham Robertson wintered at Mawson to study the foraging ecology of Emperor Penguins. He reinstated regular census work at the colony at Taylor Glacier, which has been continued since then on an annual basis (Figure 17).

Studies of the foraging ecology of Emperor Penguins in winter were undertaken in 1988, 1993, and 1994 at the Auster colony near Mawson. The composition of the penguins' diet was similar between

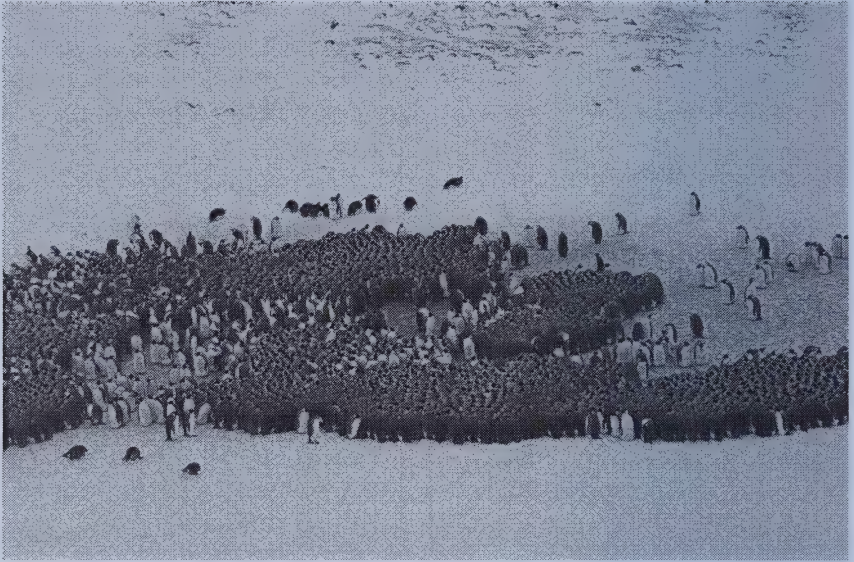


Figure 17. Emperor Penguins at Taylor Glacier, June 2006. (Photographer: Graham Cook, courtesy of AAD).

years in that Antarctic Silverfish and *Trematomus* spp. dominated the fish component, but their relative contributions to the diet differed (Robertson 1995, Kirkwood and Robertson 1997, Wienecke and Robertson 1997). Antarctic Krill was more important in August 1993 than it was in August 1994. Also, females returning to the colony in July/August 1994 had consumed less krill, but more squid, than the males on the post-fasting trip (Kirkwood and Robertson 1997, Wienecke and Robertson 1997). Previously the diet of Emperor Penguins had been determined at Amanda Bay near Davis and differed from that of penguins at the Auster colony. It consisted almost entirely of fish, principally the Antarctic Silverfish (Gales et al. 1990).

Since 1993, a number of tracking studies have been undertaken mainly from Emperor Penguin colonies along the Mawson Coast. Initially, the focus was on the determination of the foraging areas of

females from Auster in winter. It was known that females depart the colonies shortly after laying, but their whereabouts in winter was unknown. Partial tracks of two females were obtained in the winter of 1993. Both birds travelled towards a polynya (area of open water) north-east of the colony where they remained until mid-July when both trackers failed (Kirkwood and Robertson 1997). A year later, 12 females were tracked for the duration of their winter foraging trips. As in the previous year, the birds initially headed towards the polynya, but did not stay there. They moved farther west where they foraged in the pack-ice until it was time to return to hatched chicks in late July (Wienecke and Robertson 1997). On average, the females travelled total distances of about 1,630 miles (2,620 km) during their two months away from the colony, but were usually just over 80 miles (130 km) from the colony (Wienecke and Robertson 1997). An unexpected finding of these tracking studies was that females huddled occasionally while foraging in the pack ice (Kirkwood and Robertson 1999).

Summer tracking studies from the Auster and Taylor Glacier colonies of fledgling Emperor Penguins were conducted in 1996 and 2007 and of post-breeding adults in 2000/2001. The fledglings were tracked for up to 6.5 months during which they reached lower latitudes than the adults. The young birds dispersed widely and covered an area between 7°E and 93°E, nearly a quarter of the Southern Ocean (Wienecke et al. 2010) (Figure 18). Breeding adults were intercepted just before they abandoned their chicks to prepare for the annual moult. In contrast to the winter foraging, adults now ventured up to 384 miles (618 km) from the colony, travelled into open water, and reached latitudes just south of 62°S before they returned to their moult locations near the continent. None of the tracked birds returned to the colony to moult (Wienecke et al. 2004). There is still much to be learned about the at-sea distribution of Emperor Penguins and further studies are currently underway.

Development of new technologies.—During the 1990s, there was a rapid development in micro-electronics, which allowed the miniaturisation of instrumentation such that telemetry devices could be fitted and carried by penguins. These were quickly adopted by the scientists at the AAD who became leaders in the use of these technologies. Implantable identification devices gradually replaced leg and flipper bands. Time depth recorders and satellite tracked tags

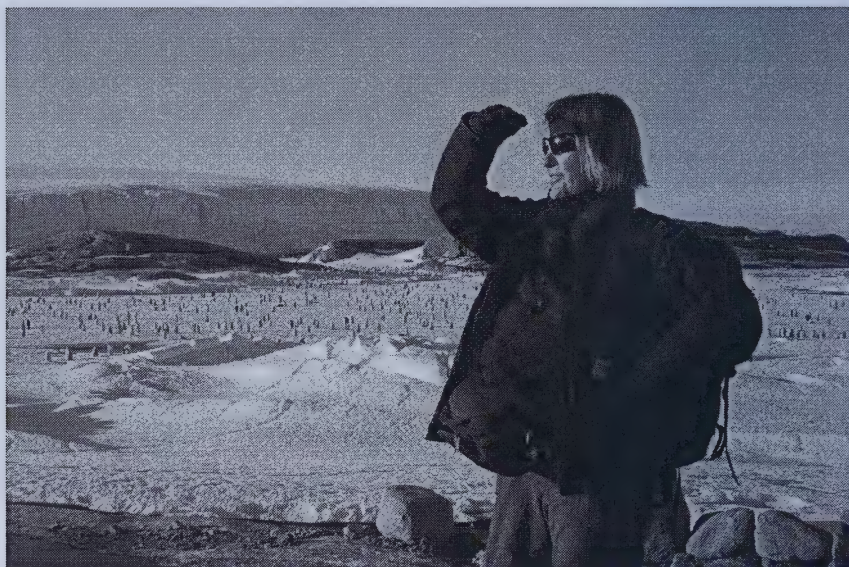


Figure 18. Barbara Wienecke. Amanda Bay, December, 2009. (Photographer: Catherine King).

suitable for attaching to albatrosses and penguins became available and allowed the visualisation of foraging in three-dimensional space. The Australian Antarctic Division maintained computing facilities and a research and development electronics laboratory to assist their biologists with the manufacture and use of the devices. Assistance was also available in the downloading of satellite derived data in real time, including the tracks of Adélie and Emperor Penguins at sea during all phases of their breeding cycle. At the same time sea ice distribution and weather conditions were also down loaded from satellites. An atlas of sea ice conditions along the coast of the Australian Antarctic Territory summarising the ice conditions for each month over several years provided a ready reference to the changes in sea ice adjacent to each of the penguin colonies and in regions through which the penguins were tracked over winter (see Michael and Hill 2003).

The collection of CEMP data for CCAMLR required regular visits to the Adélie Penguin colonies and regular handling of the birds. In an

attempt to reduce manual handling, and hence disturbance, an Automated Penguin Monitoring System (APMS) was designed and developed by staff of the Australian Antarctic Division in 1991/1992 (Kerry et al. 1993) (Figure 19). Many penguins (adults and chicks) in the main study colony received microchips that were implanted under the skin to allow the recognition of individual birds which was required to obtain the full benefit of the APMS. The APMS itself comprised a weigh bridge, two infra-red beams across the weighing platform, and an antenna that read the microchips. As the infra-red beams are broken sequentially by a crossing penguin, its direction of movement in or out of the colony can be determined. Thus, it was possible to compare the body mass of a penguin returning to the colony with its weight when it leaves the colony (Kerry et al. 1993). From the information gained it is also possible to estimate not only the changes in body mass of adults,

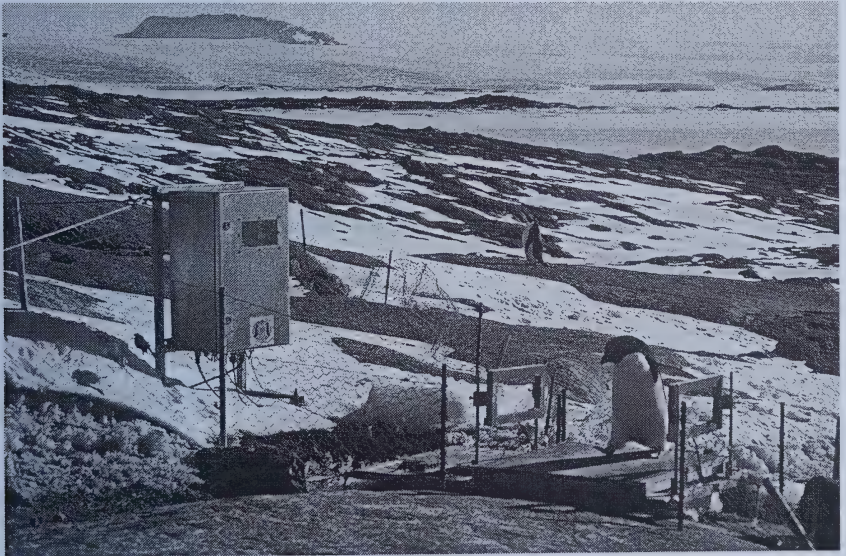


Figure 19. Automated Penguin Monitoring System at Béchervaise Island, 1999. As the penguin crosses the weighbridge it is automatically weighed, identified and its direction of travel determined. (Photographer: Wayne Papps, courtesy of AAD).

but also variables, such as foraging trip duration, the length of incubation shift, and the amount of food delivered to the chicks. APMS data have shown that in years of low breeding success long foraging trips occur, especially during the guard stage (Clarke et al. 2002), and that adults weigh significantly less than in years when breeding success is high (Kerry et al. 1995). This monitoring system has proven highly successful and has been adopted by other national programs.

Since 2004, automated cameras have been employed to reduce disturbance to the penguins, as well as facilitating monitoring activities across a larger number of colonies and a greater number of locations than was possible in the past. Commercially available, digital SLR cameras are used to simultaneously monitor 30-40 nests by taking photographs automatically throughout the breeding season. The cameras are mounted on sturdy tripods and powered through batteries attached to a solar panel. Automated cameras were first used successfully at Béchervaise Island and are now deployed at other Adélie Penguin colonies near Davis station (Newberry and Southwell 2009). In January 2011, cameras were deployed at colonies of other seabirds, including Emperor Penguins, to test their usefulness in obtaining information on, for example, first arrival at the colony, peak laying, and first hatching, in areas not usually accessible at the appropriate time of year. In 2008, a proto-type based on this system was built to monitor changes in sea ice conditions (P. Heil, pers. comm.).

The maintenance of an inventory of penguin populations is important in long-term monitoring programs (Croxall and Prince 1979). However, surveys are costly and labour intensive, particularly if regional surveys are to be conducted regularly. In 1989, remote sensing technology was employed to assess the value of satellite imagery obtained on cloud free days during the breeding season for the identification and size estimation of Adélie Penguin colonies in the Vestfold Hills and on the Rauer Islands near Davis. The accumulation of guano in the colony areas was expected to alter the spectral response of satellite mounted sensors and allow mapping of colonies across a wide area. The gneiss of the Vestfold Hills was much darker than the guano stained penguin colonies; some 86% accuracy was achieved in their identification (Bhikharidas et al. 1992). The less rocky coasts of the Rauer Islands offered less contrast and, hence, the assessment was less successful in this area (Bhikharidas et al. 1992).

Dietary studies.—Dietary studies were carried out on Light-mantled Sooty Albatrosses at Macquarie Island in 1970 and again in 1993 and at Heard Island in 1992. Scientists collected regurgitants that were expelled when the birds were disturbed by people. The researchers also collected regurgitated matter that was found next to nests, as well as casts of undigested matter (Green et al. 1998). Unlike the Light-mantled Sooty Albatrosses from South Georgia that ingested mainly squid and krill, the albatrosses from Heard and Macquarie islands fed mainly on fish and squid; krill did not appear to be part of their diet (Green et al. 1998).

Since approximately 1990, dietary studies of penguins have been conducted in the AAT and Macquarie Island using the water off loading technique (Wilson 1984). Water, either sea water or fresh water, is passed to the stomach of a captive bird through a flexible tube. The stomach is gently massaged and the bird up ended over a bucket. The procedure is generally repeated several times until the stomach is empty. This provides a sample of contents that can be sorted by number, weight, or volume of food items. This work in conjunction with satellite tracking of foraging penguins provides a detailed account of foraging behaviour in relation to diet during the chick rearing period. Such studies help to define the possible area of overlap with potential krill fisheries of both Adélie and Emperor Penguins (e.g., Kirkwood and Robertson 1997, Wienecke and Robertson 1997, Clarke et al. 2003). A similar study on Royal and Rockhopper Penguins was undertaken at Macquarie Island (Hull et al. 1997, Hull 1999).

The water off loading technique provides valuable information, but does disturb the penguins and takes food from chicks. An alternative way of obtaining similar information is the use of stable isotope analysis $\delta^{13}\text{C}$ and $\delta^{14}\text{N}$ in penguin blood and feathers and fatty acid signature analysis (FASA) in blood both of which delivered results that were similar to that determined from stomach contents (Tierney 2009, Tierney et al. 2008). Hence, the diet composition could be inferred through less invasive means.

More recently an even less invasive technique for the determination of diet composition was developed by applying DNA-based identification of prey based on DNA fragments found in the penguins' scats (Jarman et al. 2002). This technique that does not require the handling of animals as the scats can be collected from the surrounds of the colony, has been successfully used in the

determination of krill species ingested by Antarctic penguins. Work is currently underway to expand this technique to other prey taxa.

Research methods and their impact on target species.—Ethical considerations in day to day operations and conducting research on seals and birds have become increasingly important over the last decade. Some research methods are intrusive and their effect on animals is a matter of concern. It was therefore necessary to examine various techniques for their impact on the target animal and if possible to quantify the effect. The effect of the water off loading method of collecting stomach samples from Adélie Penguins was investigated (Robertson et al. 1994, Clarke and Kerry 1999). No measurable negative effects on fledgling success could be found at the time and the water offloading technique was widely accepted. However, new methods have been developed that are far less invasive and cause less stress to the birds (see above).

With advances in technology, externally attached instruments became a popular and powerful means to study seabird behaviour at sea. The effects on the health and breeding performance of the attachment of instrument packages and flipper bands, and the implantation of tags were examined (Hull 1997, Clarke and Kerry 1998). Electronic tags implanted subcutaneously were shown by X-ray examination to migrate within the fascia and some implanted at the back of the neck had migrated into the thoracic cavity. Some tags were lost, presumably through the implantation wound. Implantation immediately above the preen gland proved best (Clarke and Kerry 1998).

A problem in ornithological research is the necessity to catch and handle birds. Many studies require individuals to be caught repeatedly often over several years. In addition to any distress caused to individual birds, it is possible that handling will confound the data collected. Furthermore, large sample sizes, which are not easily obtained, are often required for statistical rigour. The approach taken by Kerry and colleagues was to develop an automated penguin monitoring system which weighs and identifies individual Adélie Penguin as they move to and from the colony (See figure 19). This requires that each individual is caught only once for tagging (Kerry et al. 1993). The same tagged birds may be identified on their nest again without capture using a wand tag reader.

Increasing visitor numbers to Antarctica raised the question about minimal approach distances to breeding and moulting seabirds. This question was equally important in the context of researchers and non-scientific visitors. Applying direct observation and the use of heart rate monitors in artificial eggs, Giese et al. (1999) demonstrated that heart rates of birds that were approached by a single person exceeded heart rate increases caused by the approach of natural predators, such as skuas or giant petrels. The researchers also noted that physiological changes occurred well before the behaviour of a disturbed bird changed. Furthermore, even disturbances considered relatively minor, for example scientists checking nests, could reduce breeding success in Adélie Penguins (Giese 1996, 1998).

A widely used mode of transport in Antarctica is helicopters as they are able to land virtually anywhere and can deliver researchers to areas they could otherwise not access. Helicopters are also used in providing transport of people and goods between vessels and stations. The Australian Antarctic Division had guidelines in place that recommended a minimal height of 3,300 ft (1,000 m) for twin engine helicopters. However, these guidelines had never been tested experimentally. Giese and Riddle (1999) measured the effects of helicopters flying over crèching Emperor Penguin chicks and found that on each approach the majority of chicks reacted and displayed behaviours usually not seen under undisturbed conditions. Although the effects were viewed as transitory and single disturbance at the recommended height was unlikely to have a long-term impact, repeated disturbance of chicks increased their energy needs (Regel and Pütz 1997) at a time when body reserves were of paramount importance for a successful moult. Hence, more conservative guidelines for safe heights were introduced into the Australian Antarctic program (e.g., 4,920 ft or 1,500 m for a Sikorsky S-76 helicopter) with the recommendation to increase the distance either if disturbance is observed or if any doubt exists that the distance is too close.

Seabird mitigation in fisheries.—In the mid-1980s, Tomkin (1985) and Weimerskirch and Jouventin (1987) reported that populations of great albatrosses were decreasing at a rate above their natural mortality and that intentional killing by fishermen was a contributing cause, as were accidental deaths as the birds interacted with fishing gear. Brothers (1991) first documented the accidental killing of albatrosses

and estimated the number of albatrosses killed in the Japanese longline fishery alone amounted to at least 44,000 individuals. Banding records dating from 1952 for the Wandering Albatross at Macquarie Island showed the decline of the population from the time longline fishing commenced in the region (de la Mare and Kerry 1994).

In 1998, the First International Albatross Conference was held in Hobart, Tasmania, where the issues concerning the conservation and status of albatross were discussed (see Robertson and Gales 1998). Robertson and Nunn (1998) proposed a new classification of the four genera of albatrosses elevating many subspecies to full species status thereby increasing the number of albatross species from 14 to 24. The two scientists provided results based on sequencing of mitochondrial DNA and concluded that the species diversity among albatrosses was richer than previously assumed. This has implications for the management of albatross populations. Although the International Union for the Conservation of Nature has endorsed an interim taxonomy of this family of seabirds accepting 21 species, more work is needed to confirm the status of each.

Meanwhile the problems albatrosses faced led conservationists and the fishing industry to combine forces and encourage the use of streamer lines that had been used in the Japanese tuna fleet to deter albatrosses from the baited hooks. A streamer line is deployed from the stern of the vessel where it acts like a scare crow reducing seabird bycatch significantly (Løkkeborg 2003) and is particularly successful in preventing albatrosses from getting too close to baited hooks. Albatrosses are exquisite fliers, but poor divers. Thus, as soon as baited hooks reach a depth of just a few metres, they are out of reach for these birds. However, experimental work with streamer lines showed they were less effective in preventing bird deaths in fisheries frequented by diving seabirds, such as White-chinned Petrels (*Procellaria aequinoctialis*) or shearwaters (Melvin et al. 2004).

The towing of a streamer line and the requirement to set and haul longlines at night has reduced the mortality of albatrosses considerably and are mandatory on longlining vessels in the CCAMLR area (CCAMLR 2008) (Figure 20). However, night setting requires dark nights to be fully effective, as moon light is sufficient to allow nocturnal hunters (e.g., shearwaters and White-chinned Petrels) to chase after baited hooks at nearly the same intensity as during the day (Klaer and

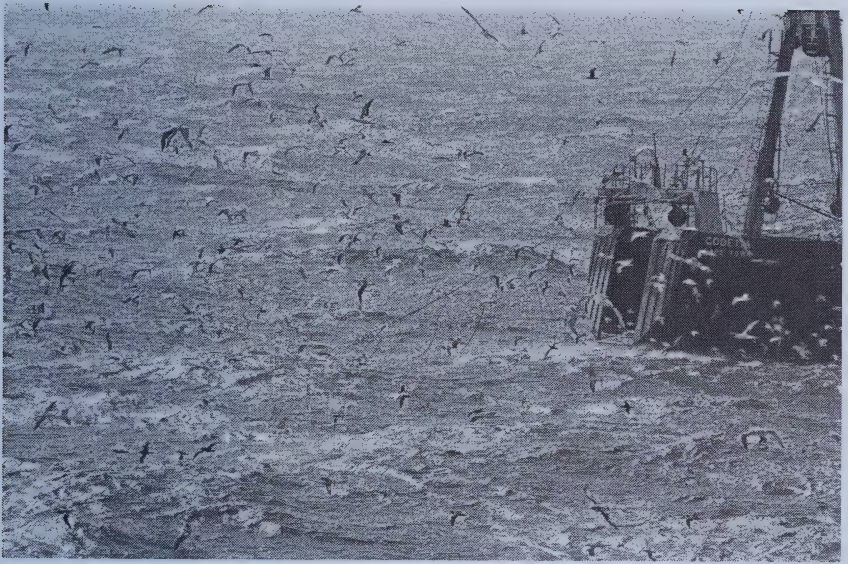


Figure 20. South African trawler towing a streamer line. The birds include Wandering and Black-browed Albatrosses, White-chinned Petrels and Cape Petrels. The streamer line is set to deter the birds from colliding with net hauling cables (warps). A similar streamer line is deployed on longliners to inhibit albatrosses and petrels diving onto baited hooks during setting and hauling. (Photographer: Graham Robertson).

Polacheck 1998). These same species also become entangled and killed by the towing cables of trawlers (Figure 20).

Modifications to the setting gear of the longlines, such as automatic line throwers in the tuna longline fishery, were tested and applied with variable success. In 1998, Graham Robertson took a novel approach to mitigation research. His premise was that if a measure could be developed that greatly reduced or even eliminated bycatch among the most vulnerable seabirds (small but competent divers, such as Grey Petrels, shearwaters and White-chinned Petrels) and this method proved successful at the time of year when these seabirds are abundant around fishing vessels, then this device should solve bycatch

in any seabird species anywhere in the world. Robertson engaged in discussion not only with members of the fishing industry in Australia and New Zealand, but also with the largest producer of longline fishing gear. Robertson realised that any device could only be successfully introduced into the fishing industry if it did not impair fishing success, was affordable, and became an integral part of the fishing gear. The latter point was particularly important in terms of achieving the elimination of seabird bycatch; a mitigation strategy built into the fishing operation did not require any extra crew or any extra effort, as for example the deployment of streamer lines does. In agreement with the line manufacturer, a number of longlines were produced whose core contained various amounts of lead, thus greatly increasing the weight of each length of longline. External weights were used on a number of vessels worldwide, but the problem was the lofting of the line between two weights which left large numbers of hooks within the reach of seabirds. The newly developed line, the so-called Integrated Weight (IW) line, proved highly successful as it achieved much higher sink rates of the gear than unweighted lines and even lines with external weights (Robertson et al. 2006). Since the added weight was evenly distributed throughout the IW line, it sank at the same speed throughout the setting process and reached depths of > 66 ft (20 m) faster than any other gear (Robertson et al. 2006). In 2003, CCAMLR adopted IW lines as a mitigation measure into its licensing conditions for longline vessels using autoline systems in the Southern Ocean (CCAMLR 2003).

Although achieving a great reduction in seabird bycatch, the IW line was still not perfect. The small diving seabirds still managed to get hold of baited hooks, albeit in lesser numbers than before. While the lines sank fast, the baited hooks attached to several metres of snoods floated near the surface until the lines reached the depth that put tension on the snoods (hook lines) and dragged them from the surface. A fisherman from New Zealand had started to develop a device that would set baited hooks several metres below the water surface. The idea was to get the hooks as deep as possible as soon as possible to eliminate all visual cues seabirds could pick up as long as the hooks were near the surface. Robertson realised the potential of this idea, but was also aware that only expert engineering would achieve the desired result. In 2010, a number of at-sea trials of this device, the underwater bait setter, commenced under commercial fishing conditions. If

successful, this device could be manufactured commercially and made available to the fishing industry.

Health and disease.—"The importance of protecting Antarctic species through limiting the introduction of alien organisms is central to the Agreed Measures and the Madrid Protocol. The pool of scientific data available to support the obligations arising from these conservation measures is limited and growing slowly. Until such data are obtained, management must be based primarily on information gained and practices applied on other continents." (Kerry and Riddle 2009, p. 3).

The Madrid Protocol is the main environmental protection tool of the Antarctic Treaty. It was adopted in 1991 by the Antarctic Treaty Consultative Parties after Australia's Prime Minister, Bob Hawke, had declared in 1989 that Australia opposed any mining activity in Antarctica as it was incompatible with the goal to protect the continent. Hawke was strongly supported by then French Prime Minister Michel Rocard.

As part of its obligations under the Madrid Protocol, the Australian Antarctic Division has placed considerable importance on understanding the possibility of disease outbreaks among Antarctica's birds and seals and to this end Kerry and Riddle (2009) prepared and edited a multi-authored book *Health of Antarctic wildlife*. This book provides a broad assessment of the health of Antarctica's birds and seals set against the background of available scientific and environmental data. The authors note that health and disease are part of a continuum and that disease may be defined as any process, infectious or otherwise, which interferes with or modifies an animal's normal function. Chapters within this book prepared by Australian authors should be consulted for an overall review of diseases of Antarctic sea birds other than penguins (see Woods et al. 2009). Clarke and Kerry (1993, 2000) previously reviewed diseases in penguins.

Within the Australian Antarctic Division operational procedures were developed and put in place to limit the introduction or translocation of infectious organisms and to contain and investigate any disease outbreak or unusual mortality event. These are included in full in the Appendices of Kerry and Riddle (2009). Several of these procedures have been adopted by CCAMLR and are published under its own banner.

Microorganisms have been studied in Antarctica for more than 100 years. The first major study was conducted by Erik Ekelöf, medical officer of the Swedish South Polar Expedition (1901-1903), who isolated and cultured bacteria from soil and water samples and from the intestines of skuas (Ekelöf 1908). Subsequently, the intestinal microflora of Antarctic seabirds received further attention (e.g., Pirie 1912, McLean 1919, Sieburth 1958). In 1951, John Bunt, member of the 1951/1952 ANARE to Macquarie Island, examined microorganisms isolated from faecal matter of various animals. He also took swabs of nasal passages and found nasal infections to be common (Bunt 1955). In 1965, an Emperor Penguin chick that had died at the Auster colony was collected and examined. It appeared to carry an agent of the psittacosis-lymphogranuloma venerum (PL) group, a group of highly infectious pathogens that affects many vertebrates including humans where symptoms are influenza like and often accompanied by severe headaches. PL agents appear to be widespread in tropical and temperate avian communities (Meyer 1967) but this was the first (and so far only) report from the Antarctic. Whether this agent caused the chick to die was not clear (Cameron 1968).

Despite the isolation of potential pathogens, research into diseases that might be prevalent in Antarctic seabird populations was not forthcoming. This was because major disease outbreaks are rarely observed (Clarke and Kerry 1993, Kerry et al. 1996). The only major die-off in the region of Australian operations occurred in 1976 when Kerry visited an Adélie Penguin colony near Mawson and found large numbers of dead or dying chicks (Figure 21). While the possibility that disease caused the mass death among the penguins, the cause of death could not be established (Kerry et al. 1996).

Another unusual mortality event was reported in 2008. Many Adélie penguins were found dead on Welch Island near Mawson Station, Antarctica. The circumstances surrounding this event suggested infectious disease as the cause. However, investigation revealed the birds had been crushed at the land-sea ice interface (Kerry et al. 2009).

Cloacal swabs and blood samples were collected from six colonies of Adélie Penguins near Casey Station, and a colony near the French base Dumont d'Urville, to examine the extent of viral infections. Serum antibodies to avian influenza were found in six of 285 samples and avian paramyxovirus serotype 1 (Newcastle disease virus) was detected



Figure 21. Dead Adélie Penguin chicks at Low Tongue near Mawson. The chicks were apparently well nourished with those still alive showing ataxia (See Kerry et al. 1996). (Photographer: K. Kerry).

in two of 42 sera that were sampled. There were no signs of clinical disease (Morgan and Westbury 1981). Similarly, in the mid-1990s, serum antibodies to infectious bursal disease virus (IBDV) were detected in Adélie and Emperor Penguins, as well as skuas (Watts et al. 2009). A summary of viruses in Macquarie Island birds was presented by Morgan (1988). Two new tick borne viruses isolated were named Nugget and Taggart after two draft horses kept by the sealers.

Neutralising antibodies, such as those found in the previously mentioned studies, imply that at some stage the birds had been infected with a virus. However, it does not mean that the disease is present in a population, as antibodies persist much longer in tissues than the viruses themselves, and viruses as such have so far not been isolated (Watts et al. 2009). Note though that increasing human activities in Antarctica and changes in the natural environments of Antarctic and sub-Antarctic

seabirds may well increase the risk of diseases being established. This subject has been covered in considerable detail in the book *Health of Antarctic wildlife* (Kerry and Riddle 2009).

CONCLUSION

This chapter summarizes a small fraction of the work that Australian ornithologists, or ornithologists working with Australians, have carried out over the last century in the Southern Ocean and Antarctica. Although Australians have been active in Antarctica and the sub-Antarctic since 1901 and vast data sets have been collected, many questions remain to be answered. Advances in technology provide new and exciting means to fill the gaps in our knowledge. Ornithological research in the Southern Ocean is driven now by Government concerns and priorities. Conservation and removal of feral animals on Macquarie Island is a major concern for Tasmania and conservation and studies in support of CCAMLR for the Federal Government. Studies of a more academic nature although scientifically important are not always accorded the same priority although these may often be piggy backed on government programs. A major limiting factor is the logistics of getting to the field sites although the use of intercontinental aircraft in addition to the RSV *Aurora Australia* has improved access. Another constraint, although generally for the good, is that of animal ethics. Recent advances in the use electronics and remote surveillance and analysis of passively collected samples such as faeces have reduced the handling and thus stress of the animals. These techniques have also provided the means to obtain data that are difficult or impossible to obtain even by handling the animal. New techniques of this nature as well as new statistical methods are being developed continuously and have been adopted by Australian scientists. Although collecting one's own field data is important there is an increasing opportunity to make use of data collected and made available by others and stored in a data centre such as that of the Australian Antarctic Data Centre (www.aadc@aad.gov.au) housed at the Australian Antarctic Division Headquarters (Figure 22). Similarly museum collections may now provide additional data through DNA analysis.

Science projects are generally approved and funded for short terms only. There is however a great need for long term studies on Antarctic



Figure 22. Headquarters of the Australian Antarctic Division, Kingston, Tasmania, Australia. (Photograph courtesy of AAD).

species particularly birds at a number of sites around the coast of Antarctica. Data sets of breeding biology and chronology of more than 10 years are available for only a few Antarctic species. The monitoring program on Béchervaise Island, now in its 21st year, has demonstrated the utility of such studies in showing the effects of environmental variables, such as weather and sea ice conditions, on breeding birds. Seabirds as top predators integrate changes in food availability and variability in the physical environment which is then reflected in variables associated with reproduction and survival. It might be expected that long term studies will show a measurable response to climate change. Comparisons made through repeating earlier research may also be useful in showing trends.

Antarctica and its surrounding islands are changing due to natural processes and those brought about directly or indirectly by human activities. In many parts changes are occurring at an unprecedented rate

putting not only individual species but entire ecosystems at risk. We need to continue our studies, particularly the long-term monitoring studies of populations, to be able to assess and predict the risks to which Antarctic seabirds may be exposed.

“Although Antarctica and the Southern Ocean have been set aside by the international community for protection and are seen as symbols of global conservation, environmental pollution in many Arctic ecosystems teaches that global challenges must be addressed and economic development must be reconciled with the environment in order to effectively protect the last unspoilt corner of the world.” (Bargagli 2005, p. 312).

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